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AMERICAN JOURNAL OF ORTHODONTICS

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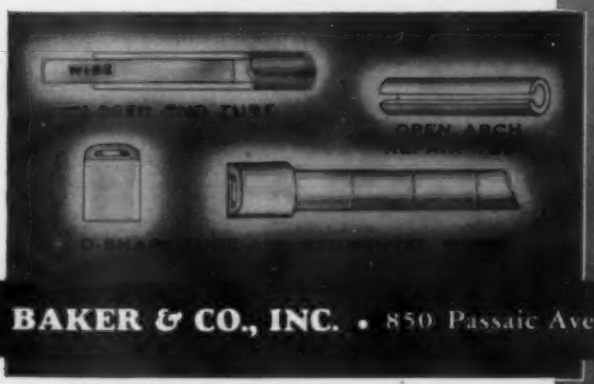

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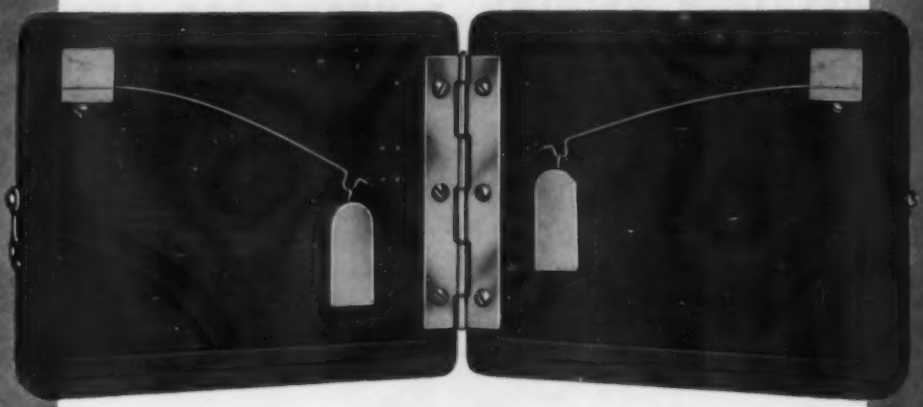

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American Journal
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VOL. 35 NOVEMBER, 1949 NO. 11

Original Articles

CHANGING DYNAMICS OF THE GROWING FACE

SPENCER R. ATKINSON, D.D.S., PASADENA, CALIF.

A GOOD idea of the anatomy of the human jaw may be obtained from histologic sections of the newborn. Muscles and bones are in place, ready to function. The inherited pattern and growth expectancy have been established. (Fig. 1.)

THE MANDIBULAR FOSSAE AND HEADS OF THE CONDYLE

The mandibular fossae at birth, and until the primary teeth begin to erupt, are practically flat planes with very little indication of a fossa or eminentia. The head of the condyle articulates on the anterior portion of the head, and is also rather flat. Both conditions harmonize with the backward and forward movement of the mandible during nursing. (Fig. 2.)

When the nursing period ceases and solid foods are substituted, the jaw movement changes to a more vertical direction. The mandibular fossae and heads of the condyles rapidly assume more mature contours. (Fig. 3.)

The areas of contact of the mandible and the maxilla are the heads of the condyle and the occlusal surface of the teeth. Under these areas of contact is located a cushion of soft tissue and spongy bone, to assist in absorbing the force exerted in masticating or forcibly closing the jaws. (Fig. 4.)

The condyle rides on the eminentia of the mandibular fossa, and not up in the fossa. The architecture of the eminentia is like that of other joints, resilient spongy bone being under the articulating cartilage. The head of the condyle has a similar type of shock absorber—spongy bone which is directly under the articulating cartilage. The neck of the condyle is formed of dense cortical bone with a minimum of cancellous structure.

Jaws normally follow a distinct inherited pattern during their growing period, with but slight, if any, change in shape. However, this is assuming no adverse influence is brought to bear on either or both of the jaws. For instance, if the teeth begin to shift into malocclusion, or if there are missing teeth or some

Presented at the meeting of the American Association of Orthodontists, New York, May 2-6, 1949.

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Fig. 1.—In shaping and molding his wares a potter makes use of two hands, one on the inside of the vessel and the other on the outside. Similarly, in both the mandible and the maxilla, the erupting teeth are also, in a great measure, directed into position by two major factors. The tongue, on the inside, pushes outward while the lips and cheeks supply a counterforce inward. The teeth and alveolar process grow between these members. If the force exerted by the tongue is equal to and balanced by that of the cheeks and lips, normal occlusion is the end product. Should there be an in-balance, malocclusion is inevitable.

Fig. 2.—At birth the bones of the face are porous, loosely connected, and in the stage of rapid growth. Because of space occupied by growing teeth, plus nutrient vessels, a minimum of calcium or solid material is present. The design of the bones of the face is such as to support best the muscles employed during nursing.

Fig. 3.—At about 10 months of age the central incisors have erupted and come into occlusion, which provides a sharp reminder that it is time to begin taking in solid food.

Fig. 4.—A longitudinal section is made through the eminentia and head of the condyle and mandibular fossa. This section shows clearly the areas of the articulating surfaces. It is quite plain that the head of the condyle is not intended to rest during action within the mandibular fossa.

other discrepancy, one side of the jaw is brought forward to accommodate a position of convenience. The head of the condyle is usually distorted, due to the continued pull of the external pterygoid muscle.

The external pterygoid muscle is attached to the anterior surface of the head of the condyle. In contracting, it draws the mandible forward and, in some instances, holds it beyond the fatigue point of bone tolerance, thus causing the head of the condyle to conform to the sustained force and change its shape accordingly. Due to the incessant muscle action just mentioned, a lip of bone is formed on the anterior portion, plus a bending forward in the neck of the condyle. (Fig. 5.) Thus, normal axial stress on the condyloid process is perverted. Force no longer travels in the direction of the inherited pattern, hence the head of the condyle begins to flatten and will continue to flatten until it is practically eliminated.

Fig. 5.—In seeking the convenience bite on the left side of the jaw, the external pterygoid on this side contracted, bringing the head of the condyle forward and holding it in a protruded position. This caused a bending in the neck of the condyle, and the beginning of a flattening of the upper surface of the head of the condyle.

If a mandible is thrown out of position and the head of the condyle rests in front of the eminentia (Figs. 6, 7, *A*, and 9), the head of the condyle will change from a convex shape to a concave one, and the pull of the temporal muscle will materially change the shape of the coronoid process (Fig. 7, *B*). The body of the entire mandible will be changed to accommodate itself to the new position in which it is placed.

Should the jaw be dislocated to such an extent that the heads of the condyle rest upon the squamous portion of the temporal bone, a cup-shaped socket similar to a bird's nest may be built from the squamous portion of the temporal bone

Fig. 6.—Unreduced luxation of the mandible. No changes in the neck of the condyle, sigmoid notch, and coronoid process as a result of change in direction of muscle pull.

A. *B.*

Fig. 7.—*A* and *B*, Normal and luxated mandible.

(Figs. 8 and 9). This newly formed socket is useful, although rough. The original mandibular fossa remains practically the same with little if any change, even over a period of years.

Fig. 8.

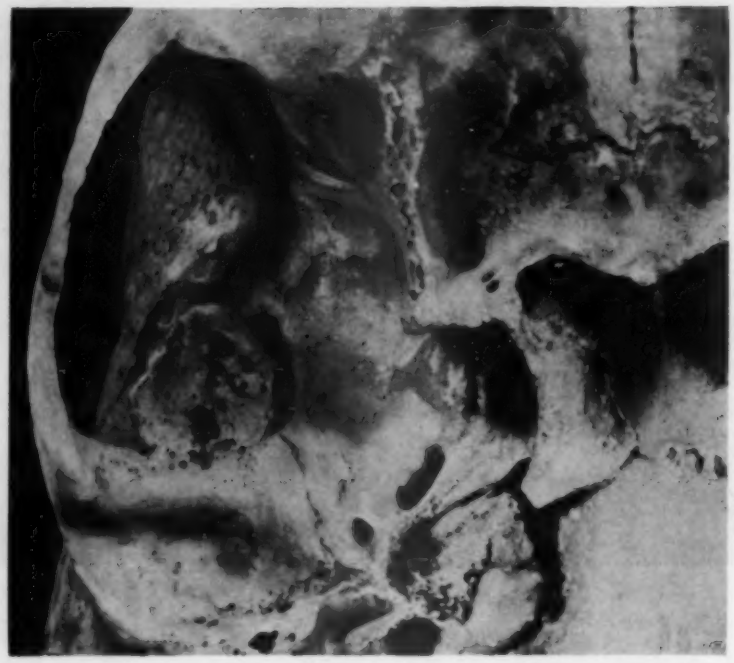

Fig. 9.

SHAPE OR ANGLE OF A MANDIBLE

In examining hundreds of skulls there seems to be no formula yet developed which even approximately expresses the "proper angle" of mandibles. Mandibles are shaped according to inherited type and conformation of the entire head—particularly the muscles of mastication—which in turn harmonize with the rest of the body mechanism. There are mandibles in which the angles are even less than right angles, and again the angles are quite obtuse. In both instances, and with all the variations, normal occlusion may be found. The distance between the head of the condyle and the tip of the coronoid process varies considerably; in some instances it may even double, and the teeth still be in harmonious occlusion.

THE SHAPE OF THE HEAD AND ARCH FORM

The old rule that the shape of the head is an index to the arch form does not seem to hold true when a great number of skulls are measured. The illustrations are examples of round skulls with narrow arches, narrow skulls with wide arches, oval skulls with square arches, and which still have good occlusion. One may choose almost any combination one desires. Of course it is possible to pick out round skulls with round arches or oval skulls with oval arches, but taking an over-all picture, the old rule seems to break down.

THE GROWING HEAD

At birth there is no alveolar process in either jaw. There is only the body of the mandible and the roof of the mouth; the two jaws are almost entirely occupied by developing teeth. As the teeth begin to erupt, the alveolar process starts to form and the maxillary sinuses begin to develop.

The growth of the cranium is almost complete at the age of 8, while the facial portion of the skull continues to synchronize with the general growth of the entire body. The facial portion has to do with oxygenation of the blood by air which passes through the nasal passages to the lungs and, with food intake, through the mouth. Air and food intake are directly associated with body bulk; larger amounts are consumed as the body increases in size. The nasal passage and the chewing apparatus continue to increase in size until full stature is attained, at about 20 years of age.

SKULL DEFORMATION

The skull rests upon the vertebral column. If the bone is of an inferior quality, lacking in resistance, the skull as a whole, due to the weight of the brain, is more or less mushroomed over the spinal column. An exaggerated example of this is Paget's disease. (Fig. 10, *A*.) The surfaces of the occipital bone articulating with the atlas are pushed up into the cranium, while mastoid processes and periphery of the skull are pulled downward. In an adult skull having normal occlusion and good quality of bone, a straight line joining the tip of the mastoid processes will just touch the surfaces of the occipital bone articulating with the atlas (Fig. 10, *B*).

Fig. 10, *A*.

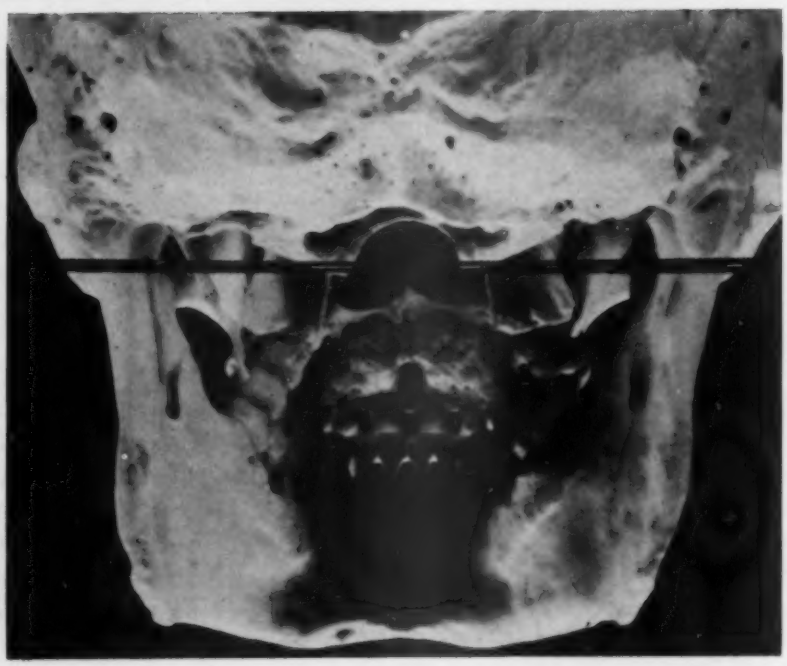

Fig. 10, *B*.

Fig. 10. *C*.

Fig. 10. *D*.

ACQUIRED DEFORMITIES

The skulls of individuals accustomed to carrying heavy loads on their backs, supporting the load through the aid of a strap around the forehead, are found to be deformed in a somewhat similar manner by this greatly increased weight. The deformation is a mushrooming of the skull over the upper portion of the vertebral column, the upper end of which has pushed the articular portion of the occipital bone up into the brain cavity. (Fig. 10, *C* and *D*.) If the bone of the skull were in good condition and resistant, this deformity would be in a lesser degree than if the bone were in a nonresistant condition.

THE KEY RIDGE

The outer surface of the maxillary bone is divided into two portions, anterior and posterior. The dividing line is the strong ridge of bone descending downward and forward from the zygomatic process of the maxillary bone. It terminates in the alveolar process just over the mesiobuccal root of the first permanent molar. This dividing line or ridge of bone has been called the key

Fig. 11.

ridge. (Fig. 11.) It is an important ever-present landmark in all skulls, regardless of racial type, age, or pattern. There is a definite relation of the buccal teeth to this key ridge all during life.

The ridge is present at birth and remains in evidence even though all the teeth are lost. The primary molars begin developing posterior to the key ridge. When the first molar of the primary set erupts, the second primary molar and first permanent molar crypt are distal to this ridge of bone; but as the child becomes older the buccal teeth occupy a more forward position, the key ridge remaining constant in its relation to the skull.

At the age of 3, the primary set of teeth are in their most perfect stage of development. Before spacing or root resorption begins, the mesiobuccal root of the second deciduous, or primary, molar is directly under the key ridge.

Fig. 12.

As the facial bones continue to grow, the relation of the buccal teeth to this strong ridge (Fig. 12) of bone changes; the permanent molars slowly approach the key ridge until, at the age of 18, the roots of the first permanent molar wedge between the buccal and lingual walls of the maxillary bone and occupy a position in which the mesiobuccal root is directly under the key ridge. When the first permanent molar is thus situated, it is in a most favorable position, from the standpoint of function, mechanics, anatomy, and facial harmony. The question may be asked why the first permanent molar does not continue to grow or drift forward when it reaches the key ridge. This may be understood better if a study is made of a group of sectioned maxillae of different ages.

From the key ridge to the tuberosity there is ample space between the buccal and lingual walls of the maxilla for three-rooted teeth. On the buccal surface of the maxilla, anterior to the key ridge, is a sharp dipping down or depression of bone, forming the canine fossa. The large three-rooted first permanent molar moves forward toward the key ridge and transverse palatal suture until it is

wedged between the buccal and lingual walls of the maxilla in the region of the distal border of the canine fossa.

In many instances in which the anterior teeth are lapped or crowded, there is a forward rotation of the maxillary first permanent molar. These teeth rotate readily, the lingual root acting as the center of rotation. The two buccal roots may rotate in a segment of a circle without breaking through the buccal plate of bone into the canine fossa (Fig. 13). Should the buccal teeth drift forward of the key ridge without rotation, the mesiobuccal root of the upper first molar will protrude into the canine fossa and become denuded of bone. In such a situation, the periodontal membrane will be destroyed and the protruding root of the tooth will then begin to be resorbed.

Fig. 13.

There are some rare instances in which it appears as though the mesiobuccal root of the upper first molar is forward of the key ridge and in the canine fossa. In such specimens the maxillary sinus was not normal, in that there was a collapse of the outer plate of the maxillary sinus accompanied by a deep cupping of the labial wall. This condition is called "collapsed antrum." (Fig. 14.)

AXIAL STRESS

If a horizontal section is made of the mandible of a horse, the roots of the molars will be revealed below the alveolar crest in an angle iron or U shape, with cross bracings of spicules of bone. The design is quite similar to supports in modern bridge design. (Fig. 15.)

In newly erupted molars the bony spicules are extremely delicate, tightly packed, and rich with marrow or bone building material (Figs. 16 and 19). This is the time when teeth may be moved physiologically, easily and rapidly. As the

Fig. 14.

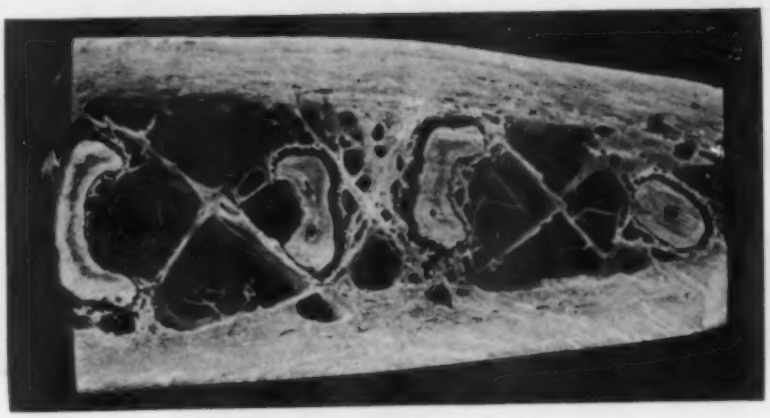

Fig. 15.

Fig. 16.

Fig. 17.

Fig. 18.

Fig. 19.

tooth comes into function, the more or less disorganized, spongy bone begins to assume definite characteristics. The spicules become arranged in accordance with individual type and function as stress for the final support of the tooth during life. (Figs. 17, 18, and 20.)

Fig. 20.

TOOTH ANOMALIES

As to the teeth themselves, there are many variations. One common variation observed on molars is a strip of enamel growing down the buccal surface of the crown between the roots. This enamel has an attachment of enamel epithelium which is not very stable, and may be one cause of concern to the periodontist. (Figs. 21, 22, 23, and 24.) The alveolar process does not adapt itself closely in this area (Fig. 25). There is more or less a gateway to accommodate this strip of enamel extending between the roots of the teeth. Under such conditions it would not be impossible for orthodontic bands to be blamed for a periodontal condition which was actually caused by these unfortunate growths of enamel (Fig. 26).

Another anomaly of enamel is found in cases in which there is an invagination of enamel, causing a lingual pit in the maxillary lateral incisor (Fig. 27). Occasionally this invagination appears to close, but it actually opens apically again into a hidden cavity, sometimes quite extensively (Fig. 28). This hidden cavity always runs parallel to the pulp, from which it is entirely disconnected. These cavities, or invaginations, are easily recognized by x-rays, and with proper instrumentation and technique they may be filled safely without injury to the pulp. If ignored, caries is the rule and the pulp may be invaded or the caries may extend to the outside, or both may result.

Fig. 21.

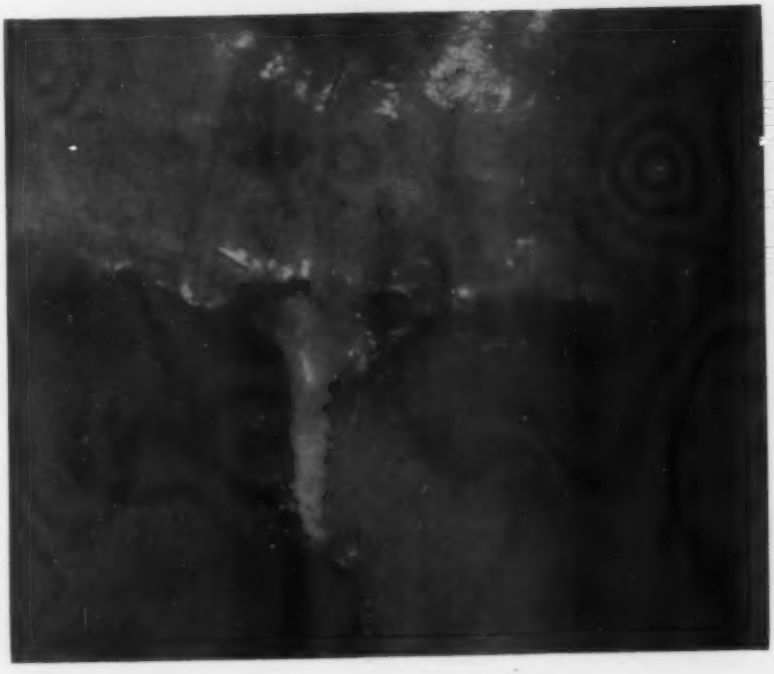

Fig. 22.

Fig. 23.

Fig. 24.

There is another type of invagination usually found in canine teeth in the maxilla, and sometimes called "dens in dente." (Fig. 29.) These deep invaginations have an opening to the outside world. There are occasions when these teeth remain vital and may be saved. On other occasions they become nonvital, resulting in loss of the tooth.

If the bottom of the invagination is completely sealed over before the tooth erupts, it may remain vital if properly filled. But if the tooth erupts before the bottom of the invagination seals over, the pulp is automatically exposed and immediate death of the pulp and loss of the tooth follow. Sections of such a tooth will clearly show the internal structure of such invagination. (Fig. 29.)

Fig. 25.

SPACING OF PRIMARY TEETH

Many mandibles have been examined in the skulls of children 6 years of age, in which there was no spacing of anterior teeth. The teeth, to and including the first permanent molar, on one side of the mandible were left in place, while the deciduous, or primary, teeth on the opposite side were removed and the unerupted permanent teeth were taken from the same mandible and placed in line, as they would be in the mouth. In such cases it is found that there is ample room anterior to the first permanent molar to accommodate the permanent teeth.

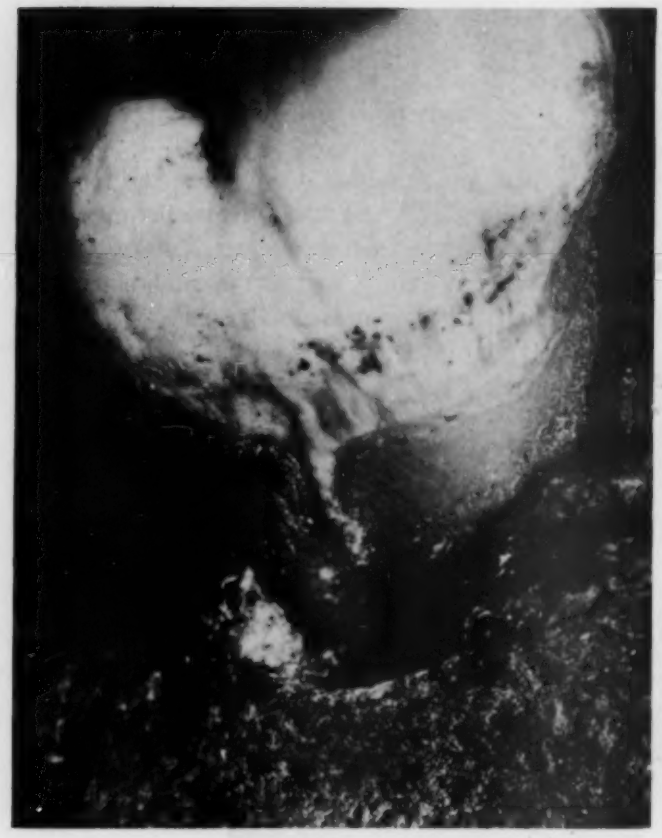

Fig. 26.

Fig. 27.

Fig. 28.

One might assume this would also be true in the living, provided the first molar has not been allowed to drift forward, but remains in its position. Even in cases in which there is a crowded condition of the anterior teeth, there still seems to be room for the permanent teeth to be in proper alignment, provided that the first permanent molar does not drift forward. This, of course, is not the case if there is a severe bunching or lapping of the teeth and a real lack of development in the jaws. However, such conditions are rare.

Fig. 29.

A lifelong study of hundreds of skulls, both juvenile and adult, and years of active practice produce convincing evidence of the advisability of prevention where possible. If not, then early treatment should be given, and the denture should be supervised from both the physical and the psychological standpoints. Children are extremely sensitive—much more so than older people. They suffer keen humiliation from having their faces deformed by irregular teeth, and develop inferiority complexes which in many instances are never overcome.

As the face develops normally, according to a definite pattern, it is wise to correct any condition before it has had an opportunity to deviate from this pattern. In this way there is less work to do and less chance of error in judgment.

When orthodontic appliances are employed, especially if an unnecessary amount of force is exerted, fibrous degeneration of the pulp and a hastening of the resorption of the alveolar crest are likely to be initiated. If appliances are used on deciduous teeth, this is not so important. When a deciduous tooth is lost, its process is also lost. A new process and a new pulp will develop with the new permanent tooth.

In young children the cells are more numerous and potent than they are in older individuals. The bone is more porous and less dense. There is not so much reorganization to be done, either in degree or extent.

It is hopeless to expect to find a strong, healthy process and periodontal membrane supporting teeth which have long been out of function. In such situations both the bone and the membrane are disorganized. As teeth out of function are really sick teeth, it is highly desirable to keep them in function, especially during the growing period.

Jaws kept free from extraneous unnatural forces, and in function during their growth and development, are not likely to be those which "inherited the teeth of one parent and the jaws of the other," nor will there be the temptation for the judicious extractions which in the immediate past were resorted to so eagerly. Orthodontists are slowly but steadily learning that perfection is not attained by mutilation.

The face normally develops according to a definite, inherited pattern. Should there be evidence of a divergence from normal, every effort should be made to discover and remove the cause. In many instances the defect is self-correcting after the cause has been removed. If not, then therapeutic means of as simple a nature as possible should be instituted, and the inherited pattern restored to such an extent that normal growth will finally overcome any defects which may have been acquired.

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TEMPOROMANDIBULAR MUSCLE CONTRACTION PATTERNS IN ANGLE CLASS II, DIVISION 1 MALOCCLUSIONS: AN ELECTROMYOGRAPHIC ANALYSIS

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INTRODUCTION

MANY orthodontists feel that their greatest clinical problem is the handling of Angle Class II (distoclusion) cases. This is true, perhaps, for two reasons: their frequency and their difficulty. Historically we have grouped together here, for the sake of convenience, cases with varying etiologies. Further, we have often proceeded to treat all of these cases in the exact fashion. Though we have invented new appliances, clever classifications, and even relied on rule of the thumb extraction procedures, still they remain one of our tantalizing clinical enigmas.

This paper reports a research effort undertaken to learn more about the etiology of Angle Class II (distoclusion) cases.

Remarkably fine work has been done by orthodontic researchers on the growth patterns of the bones of the face and cranium (Brodie,[11, 12] Broadbent,[9, 10] Hellman.[36, 37] Techniques have been devised for tracing standardized cephalostatic roentgenograms as a means of accurately locating the dysplastic areas (Downs[22]). Downs in this latter work has pointed out the fact that aberrations in the growth of any of several areas may give rise to an Angle Class II relationship. But this still leaves unexplained why the dysplasia occurred.

Embryologically bone is a later tissue than muscle. The elaborate temporomandibular and facial musculature is well defined by the time ossification of the face and cranium gets under way (Arey[3]), the bones developing within an envelope of muscle and fascia. Though capable of contracting, the muscles are not functioning; but they do exert a molding influence on the forming bone. Gradually the muscles seek their osseous attachments, and after so doing exert an even greater influence on the developing bony tissue (Washburne[69]). Postnatally, muscle tissue grows little by differentiation of additional fibers but rather by hypertrophy of existing muscle cells. Once active contraction begins in a muscle, it exerts a continuous effect on the bones to which it owes its origin and insertion. Histologists describe bone as one of the most plastic tissues, pointing out how readily it responds to the tensions and forces placed upon it by muscle. Thus we see that prenatally muscle has had a dominant role in the determination of the conformation of the individual bones, while postnatally it continues to direct osseous growth by the sheer effect of function. Furthermore, the relationship of one bone to another is determined, in certain articulations, by muscle action alone.

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Is it not plausible, then, in view of the facts mentioned, to consider the role of the temporomandibular musculature in the production of dentofacial deformity?

A contracting muscle gives rise to what has been called an action potential or a spike potential (Lloyd[52]). This minute electromotive force is generated only during contraction, and its size is held by most muscle physiologists to be proportional to the strength of the contraction (Dempster and Finerty[19]). A resting muscle exhibits no spike potential (Lloyd,[52] and Hoefer and Putnam[43]). Electromyography, then, concerns itself with the recording and study of these electrical phenomena within muscle as a means of analyzing the nature of the contraction.

This study is an exploration, by means of electromyography, into the role of the temporomandibular musculature in the genesis of Angle Class II (distoclusion) dentofacial deformity.

METHODOLOGY

Apparatus.—The electromyograms were taken on an Offner Type A six-channel electroencephalograph (Fig. 1). This was equipped with an audio unit, a six-element crystographic ink writing recorder, and a synchronous motor-driven paper feed (Fig. 2). During all readings the subject was placed in an electrically shielded room.

Electrodes.—Three types of electrodes were used: (1) monopolar surface electrodes consisting of a silver disk 3/8 inch in diameter and used with electrode paste as a conductor to the skin and celloidin as a dermal adhesive; (2) monopolar needle electrodes; (3) dipolar needle electrodes consisting of a 26-gauge needle with insulated obturator. As far as possible all three types were used with the various muscles until the most efficacious electrode for each individual experiment was ascertained.

A. Temporal muscle: This muscle has been studied with as high as six electrodes, though three as shown (Fig. 3) were ordinarily used. Surface electrodes proved more efficacious since they did not interfere with the action of the muscle. The availability of the muscle and the absence of underlying superimposed, or adjacent, muscle masses made this the easiest muscle on which to obtain routinely high grade readings.

B. Masseter muscle: As a regular procedure only one surface electrode placed near the motor point of the muscle was utilized. However, up to three needle electrodes were used, as well as one surface and one needle electrode in combination. These latter procedures were in an effort to differentiate the action of the two heads of the muscle.

C. Internal pterygoid muscle: Surface electrodes here failed to give constant worth-while readings; therefore, needle electrodes of both the monopolar and dipolor types were brought into use. A strip of adhesive or Scotch tape was used to maintain the needle in a position parallel to the course of the fibers of the muscle (Fig. 4).

Fig. 1.—Offner Type A electroencephalograph.

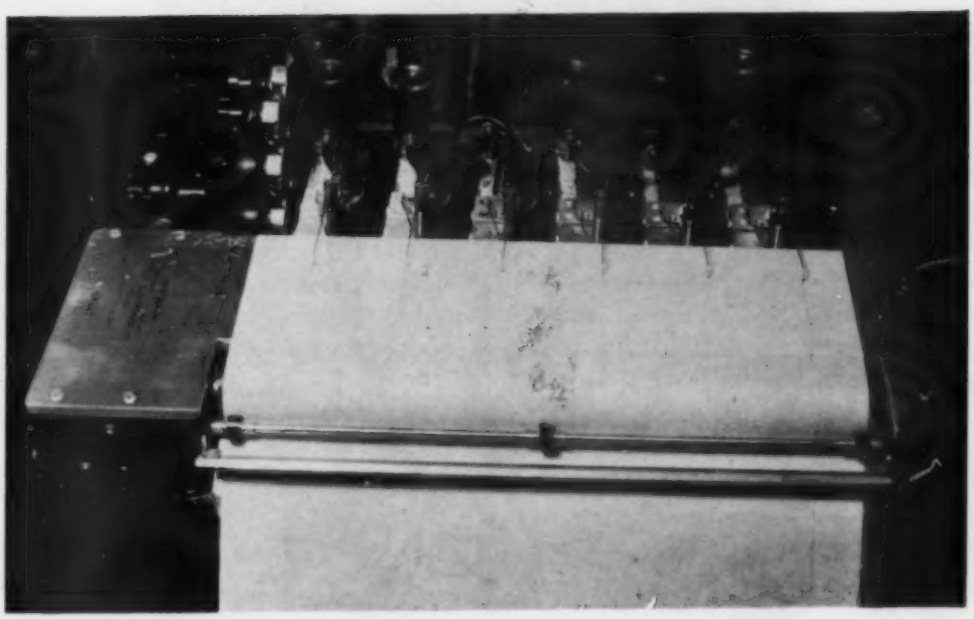

Fig. 2.—Six-element ink writer.

Fig. 3.—Electrode positioning for the temporal muscle.

Fig. 4.—Position of the needle electrode in the internal pterygoid muscle.

D. External pterygoid muscle: The attainment of reliable electromyograms from this muscle has been and continues to be one of the real problems in these studies. Many different approaches have been tried, but the most successful involved the use of a curved intestinal suture needle as a monopolar electrode. This was inserted through the oral mucosa behind the maxillary tuberosity in a direction lateral, posterior, and superior to the tuberosity. After insertion the channel was switched to the audio unit and the subject was instructed to open his mouth. If the peculiar crackling sound of muscle was heard, the needle was known to be in the correct position. A piece of soft brass ligature wire encircling the last maxillary molar provided support for the needle during mandibular movements.

E. Suprahyoid muscle: Both multiple needle and single surface electrodes have been used, depending upon whether the action of a single muscle or the group was under study. All suprahyoid electromyograms referred to in this study were obtained by a single surface electrode. These readings, therefore, represent the combined spike potentials of the suprahyoid musculature.

F. Mental muscle: Both the surface and needle electrodes gave satisfactory readings on this muscle, and both were used.

Normal Standards.—All comparisons with the normal in this study were based on "An Electromyographic Analysis of the Normal Temporomandibular Musculature."* This latter work analyzed electromyographically the muscle function patterns in thirty-one cases presenting "normal" or "ideal" dentofacial growth. Sixteen of the subjects were adults and fifteen were children ranging from 3 years, 6 months upward. This study of normals was begun some two years ago to learn more about the dynamic functional anatomy of the temporomandibular articulation. The present paper is an outgrowth of the larger study.

Selection of Subjects.—All of the subjects in this study have been or are being treated or observed in the Department of Orthodontics at the State University of Iowa. All would be, according to the Angle classification, Class II, division 1 malocclusions. They range in age from 4 years, 6 months to 16 years. Table I summarizes the pertinent facts about the subjects of this study. Care was taken to select subjects comparable in age to those used in the study of normals previously mentioned. Routine gnathostatic casts, full intraoral roentgenographic surveys, lateral and posteroanterior cephalostatic roentgenograms, and cephalostatic photographs, as well as the usual case history, were taken at regular intervals. Before any electromyograms were made, all of the subjects were arbitrarily classified as follows: (a) total mandibular retroversion;† (b) mandibular dental retroversion; (c) total maxillary anteversion; (d) maxillary dental anteversion. An Angle Class II malocclusion might conceivably be any one of these four or a combination of these possibilities. Table II summarizes this grouping procedure.

*Dissertation presented by the author in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

†As far as possible throughout the remainder of this paper the terminology suggested by the Nomenclature Committee of the American Association of Orthodontists will be used (Am. J. Orthodontics 34: 869-872, 1948).

Recording Procedure.—After the placing of the electrodes, the subject was seated on a stool without back or headrest. All of the movements to be performed were previously practiced in front of a mirror in imitation of the author. This procedure was repeated before any readings were taken. The first electromyograms taken were those of "tonus." This helped relax the subject and was an indication to the researchers of any nervous anxieties which might produce artifacts. Each mandibular movement was repeated a minimum of ten times to enable taking readings at various recording paper speeds and to insure constancy of findings. Each of the subjects in this study was examined electromyographically at least three times. One boy (A. L.) had temporomandibular electromyograms on seven different occasions. Fifty-eight sets of readings taken on sixteen patients over a period of thirteen months are represented in this study.

TABLE I

NO.	SUBJECT	SEX	AGE (AT EACH READING)
1.	A. L.	M.	11-9, 11-11, 12-0, 12-3, 12-5, 12-9, 12-10
2.	K. L. J.	F.	9-6, 9-10, 10-0, 10-7, 10-7
3.	A. K.	F.	6-7, 6-7, 6-9, 6-9
4.	G. H.	M.	5-8, 5-10, 5-11
5.	P. C.	F.	4-11, 5-0, 5-5
6.	T. E.	M.	11-10, 11-11, 11-11
7.	D. H.	F.	4-9, 4-11, 5-0
8.	M. D.	F.	10-8, 11-1, 11-2, 11-4
9.	K. R.	M.	15-10, 16-0, 16-4
10.	T. P.	F.	14-3, 14-5, 14-8
11.	B. S.	M.	0, 8-0, 8-1, 8-5
12.	J. M.	M.	11-3, 11-4, 11-5
13.	R. M.	M.	14-9, 14-11, 15-0, 15-0
14.	M. B.	M.	8-10, 9-0, 9-1
15.	B. C.	M.	8-9, 8-11, 9-1
16.	M. C.	F.	4-6, 4-8, 4-10

Total males, 9.
Total females, 7.
Age range, 4 years, 6 months—16 years, 4 months.

TABLE II

NO.	SUBJECT	TOTAL MANDIBULAR RETROVERSION	MANDIBULAR DENTAL RETROVERSION	TOTAL MAXILLARY ANTEVERSION	MAXILLARY DENTAL ANTEVERSION
1.	A. L.	x		x	
2.	K. L. J.	x			
3.	A. K.	x			
4.	B. H.	x			
5.	P. C.	x			x
6.	T. E.			x	
7.	D. H.	x			x
8.	M. D.			x	
9.	K. R.				x
10.	T. P.				x
11.	B. S.			x	
12.	J. M.	x		x	
13.	R. M.	x			x
14.	M. B.	x			
15.	B. C.	x			x
16.	M. C.				x

FINDINGS

Electromyographic techniques are not yet perfected so that precise quantitative studies are possible. Variations in thickness of the integument, discrepancies in placement of electrodes, and differences in instrument adjustment and response from day to day all are factors in this problem. No doubt they will be solved in the future, but just now we must confine ourselves to discussing only gross aberrations in muscle function pattern, and those in a rather qualitative manner. It is possible to compare parts or heads of the same muscle and one muscle against another *in the same subject if the readings are taken in a similar and simultaneous manner.* But even this must be done with a great deal of restraint. Variations in manner and type of response are, of course, a different matter. So, too, is the presence or absence of an active spike potential. Only those muscles will be discussed separately which are of interest when viewed alone. For the most part, the pattern of interaction of all the muscles is the most interesting one.

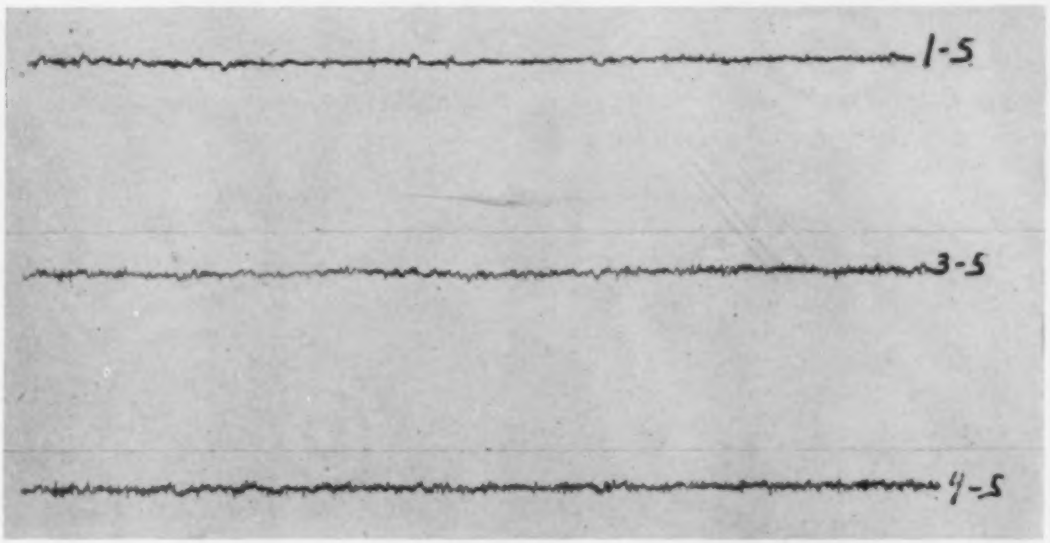

Fig. 5.—*1-5*, Anterior fibers of temporal; *3-5*, middle fibers; *4-5*, posterior fibers. Note the uniformity of "tonus."

Temporal Muscle.—The electromyograms of the temporal muscle in the subject with normal dentofacial development are most unusual in several respects. In the first place, there is a remarkably even state of "tonus" in all parts of the muscle when it is at rest even though the muscle usually has a triple innervation (Fig. 5). During elevation and depression of the mandible, there is uniformity of the spike potentials with regard to size, character, and frequency (Fig. 6). This uniformity is lost in cases of mandibular retroversion, many of which display greater contractions from the posterior fibers than from the anterior fibers (Fig. 7).

It has been demonstrated that this muscle responds in a tripartite manner during some mandibular movements. While this can best be illustrated by certain isometric contractions, it is also seen during abduction of the gnathion,

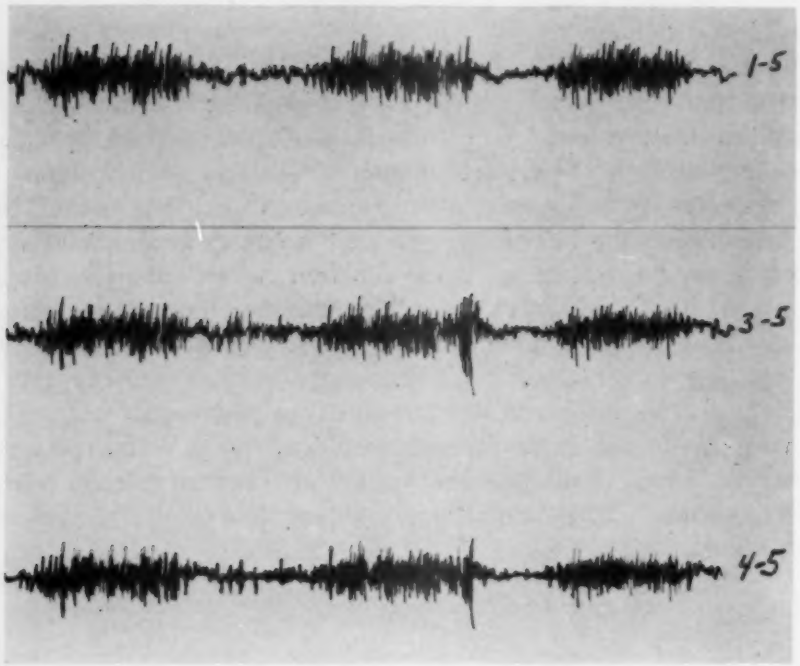

Fig. 6.—Mandibular depression and elevation in the normal subject. Same subject as Fig. 5.

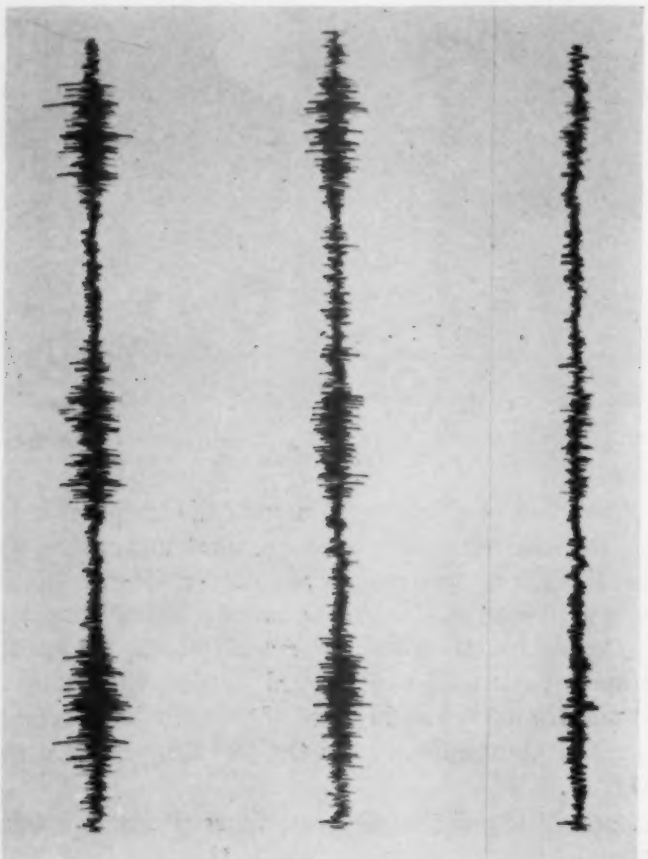

Fig. 7.—Mandibular depression and elevation in a subject with mandibular retroversion. Anterior temporal fibers are to the right. Posterior fibers are to the left.

the prosthodontists' lateral excursive movement (Fig. 8). Little difference could be seen between the electromyograms of subjects in this study and those in the normal study during this movement. The most striking variation was seen in this muscle in cases of mandibular retroversion. In this condition the posterior fibers invariably showed gross deviations from the expected electromyographic pattern. These will be discussed in detail later.

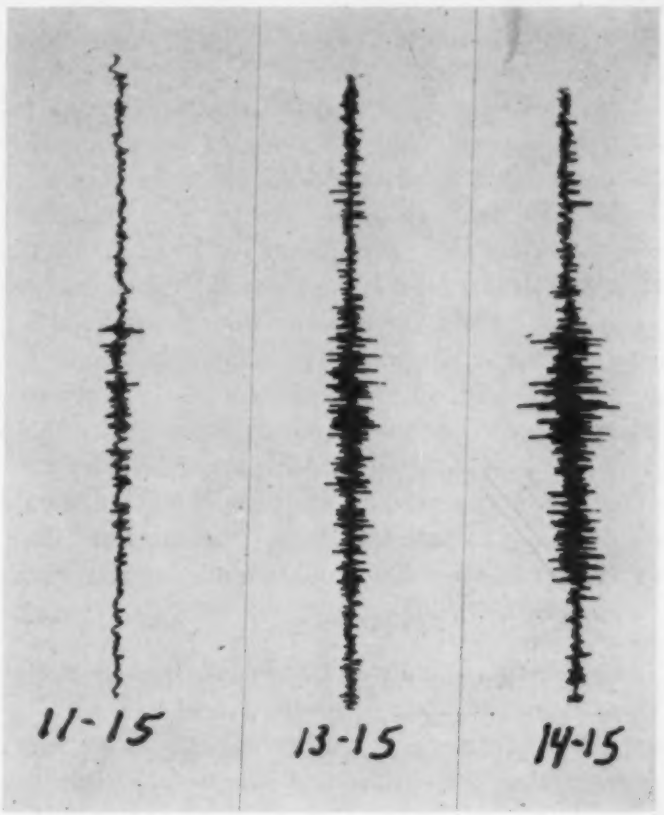

Fig. 8.—Abduction of the gnathion. *11-15*, Anterior temporal fibers; *13-15*, middle fibers; *14-15*, posterior temporal fibers. This reading is from the right temporal muscle during movement of the mandible toward the right.

Mental Muscle.—While not a masticatory muscle, this muscle is of interest due to its hypertrophy in some types of dentofacial deformity. Little unusual is found in electromyograms of the mental muscle. As would be expected, the muscle is apparently used more by those subjects displaying gross hypertrophy. A large number of the subjects in this study had great difficulty in relaxing the mental muscle when the teeth were in occlusion. However, there is no correlation between spike potentials in this muscle and any mandibular movements.

Suprahyoid Muscles.—No variation was seen in the action of this muscle group between normals and the subjects of this present study.

In the present study, ten subjects were arbitrarily classified as total mandibular retroversion cases. All of these demonstrated an imbalance in the spike potentials from the temporal muscle. Six of the subjects presented an Angle

Class II (distoclusion) condition without mandibular retroversion. Actually, the subjects tend to fall into four rather clear-cut groups as far as the electromyographic patterns are concerned. These groups correspond, in a way, to the classifying done prior to the study (Table II). The groups will be discussed separately.

Group 1.—Four subjects showed normal electromyographic patterns in all of the muscles except the temporal. Here the deviations were seen in the most posterior fibers, and then only when the mandible was in physical or physiologic rest position. At all other times the temporal electromyograms could not be diffrentiated from those taken during the study of normals. Three of the four showed markedly stronger spikes in the posterior fibers only when the mandible was in physical rest. The fourth did not allow for differentiating between physical and physiologic rest position. Figs. 9 and 10 (K. L. J.) illustrate this group. It is typical of this group to show spike potentials from the posterior fibers of the temporal muscle that are greater in size than those from the middle or anterior regions of the same muscle while mandibular posture is being maintained. Further, during strong isometric contractions with the teeth in occlusion there is a greater rise in frequency in the posterior temporal muscle fibers than those more anteriorly placed. This group displays no hypertrophy of the mental muscle in any case, nor is any marked evidence of maxillary anterior disastema present. It is interesting to note that these four cases are the same four that were previously classed as exhibiting total mandibular retroversion only (K. L. J., A. K., B. H., and M. B.).

Group 2.—Of the original ten mandibular retroversion subjects, we are now left with two classed as mandibular retroversion and total maxillary anterversion and four as mandibular retroversion and dental maxillary anterversion. These six presented similar electromyograms and comprised our second group. They differed from the four previously mentioned in that during all mandibular movements the posterior temporal fibers were in a state exhibiting greater spike potentials than the remainder of the muscle (Figs. 11 and 12). Every case in this group showed a strong tendency toward overbite, and this was particularly true of the two cases classed as total mandibular retroversion with total maxillary anteversion. All but two displayed marked mental muscle hyertrophy, whereas none was seen in the four cases comprising group 1.

Group 3.—This group showed a temporal muscle quite normal in all respects except that the most anterior fibers gave a slight spike at the initiation of mandibular depression. While this phenomenon has been seen in normals, it is not routinely observed in them. All three cases in this group were similar in this respect. The domination of mandibular elevators over the depressor muscle was evident. All three cases had extreme overbite and hypertrophy of the mental muscle.

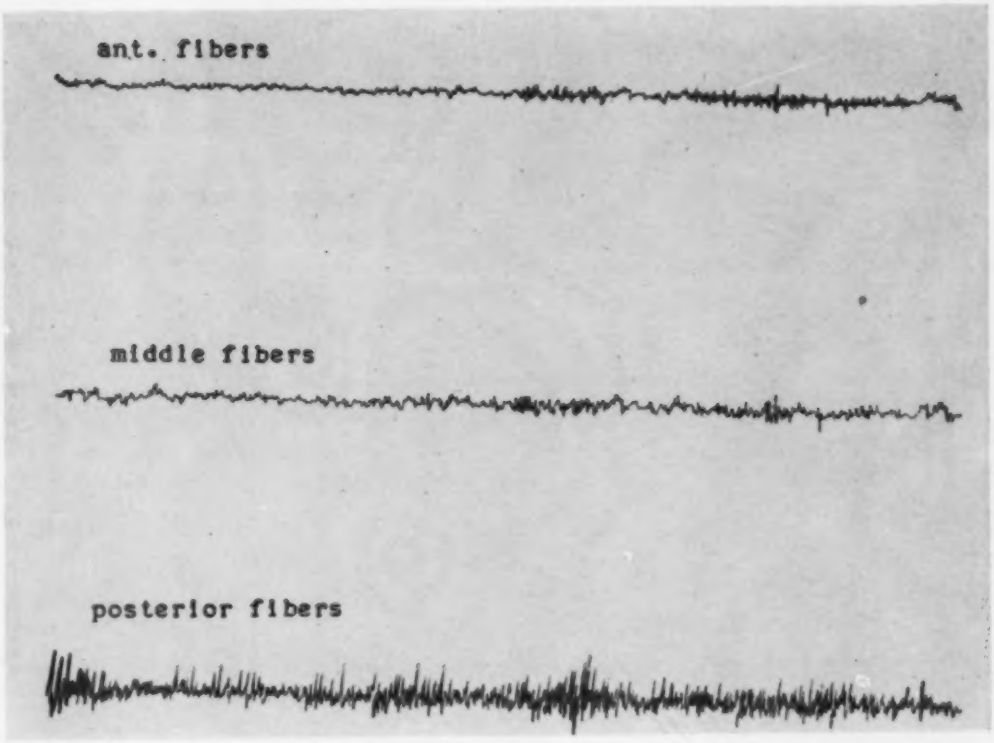

Fig. 9.—K. L. J. "Tonus" in resting temporal muscle prior to orthodontic therapy.

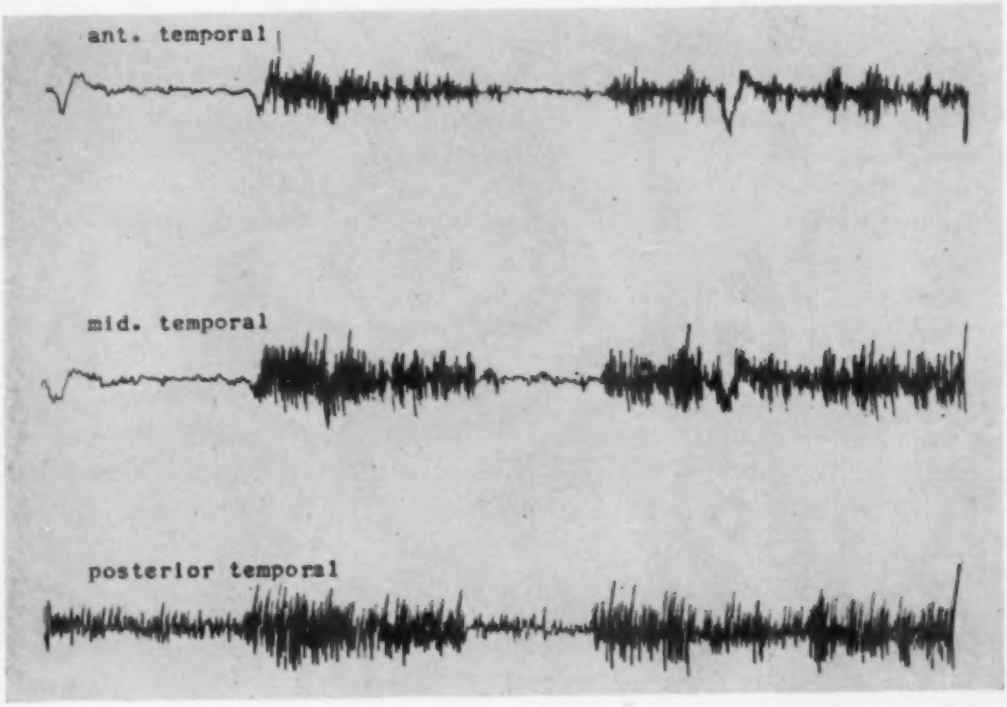

Fig. 10.—K. L. J. Depression and elevation of mandible prior to orthodontic therapy.

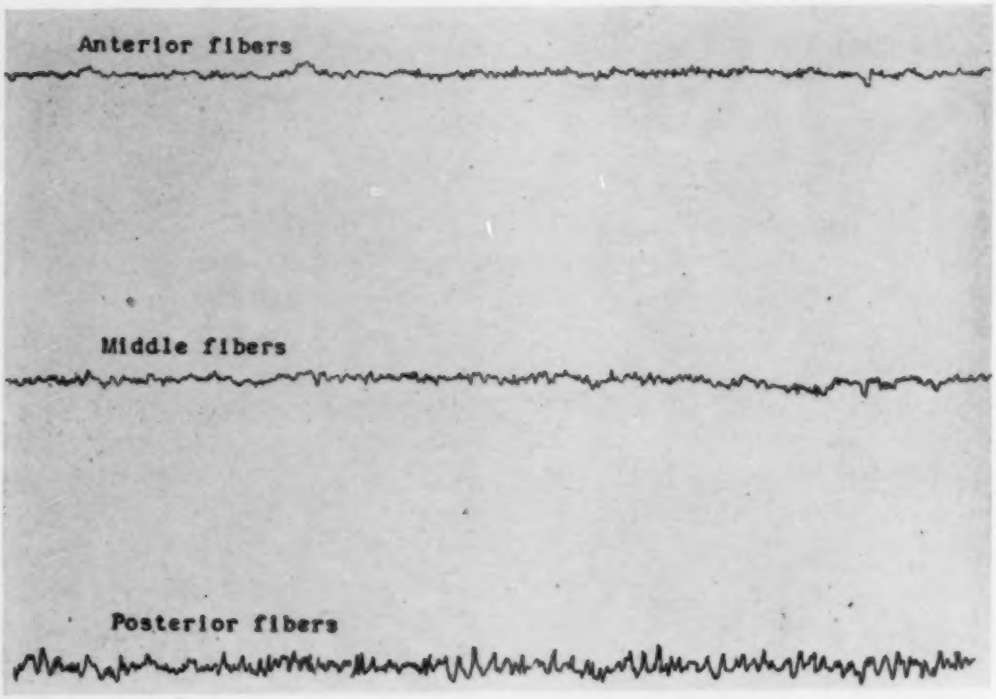

Fig. 11.—P. C. "Tonus" in relaxed temporal muscle.

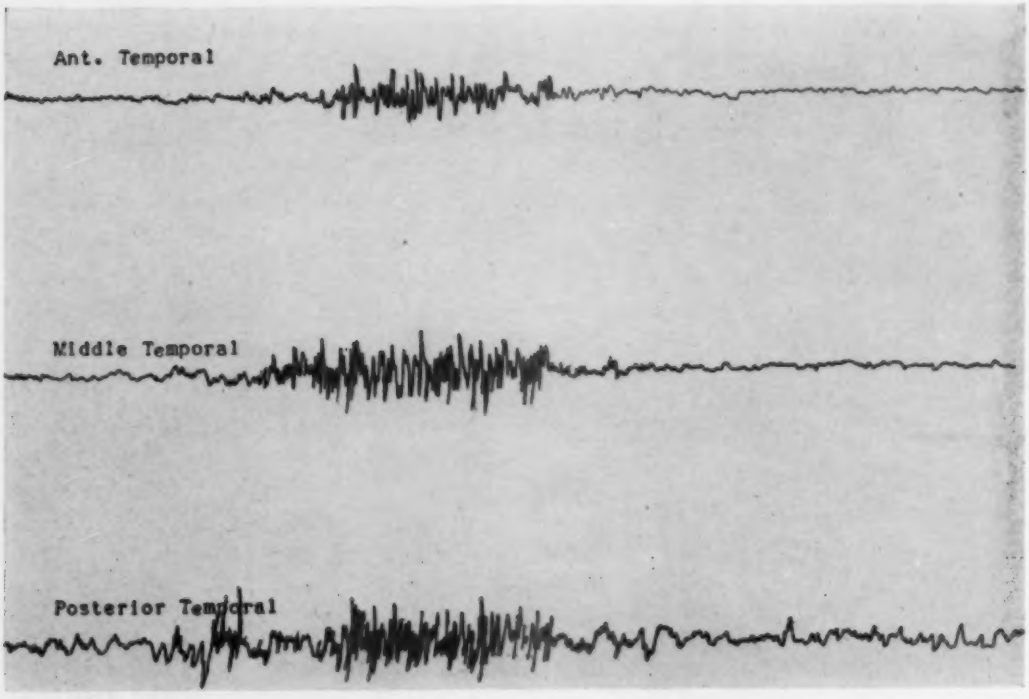

Fig. 12.—P. C. Depression and elevation of mandible.

Group 4.—The pterygoid and masseter muscles presented a normal picture, while the temporal muscle was normal in two cases and the posterior fibers showed increased spikes in one case. The mental muscle was hypertrophied in all three cases. All cases also presented an anterior open-bite and gave a history of thumb-sucking and/or tongue-thrust habit.

Once the patterns of dysfunction in the temporomandibular musculature are seen in cases of dentofacial deformity, the question that immediately comes to mind is, "What effect does orthodontic therapy have on the electrical phenomena observed in these muscles?" That query will be probed so far as data in this study will permit.

Fig. 13. Fig. 14.

Group 1.—Fig. 13 is a photograph of gnathostatic casts taken at approximately the same time as the electromyograms in Figs. 9 and 10. This was prior to any orthodontic therapy. The casts in Fig. 14 were made when orthodontic treatment was nearing completion, as were the electromyograms in Figs. 15 and 16. Treatment in this case consisted primarily of an overt attempt at mandibular displacement anteriorly. This was accomplished, in this case, with an acrylic palatal plate with carefully placed sloping bite plane. This caused the mandible to slide forward into its correct relationship each time physical rest position was approached. In such a case the therapy is directed primarily toward learning new muscle function patterns and not toward massive tooth movements. The success of this rationale is shown in Figs. 15 and 16. A comparison of these electromyograms with those taken prior to treatment (Figs. 9 and 10) revealed several interesting facts. The enlarged "tonus" spikes from the posterior temporal fibers had been diminished to a point where the muscle compared favorably with the normal (Fig. 5). There was also uniformity of all parts of the temporal muscle during mandibular depression and elevation (Fig.

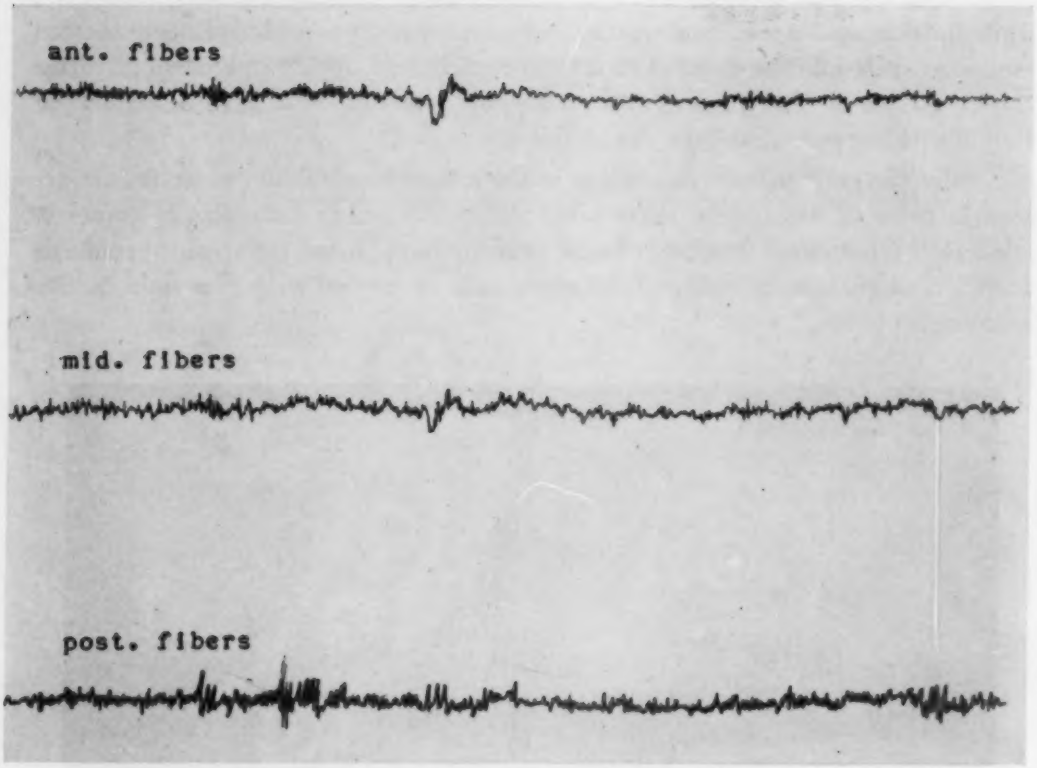

Fig. 15.—K. L. J. "Tonus" in resting temporal muscle after the completion of orthodontic therapy.

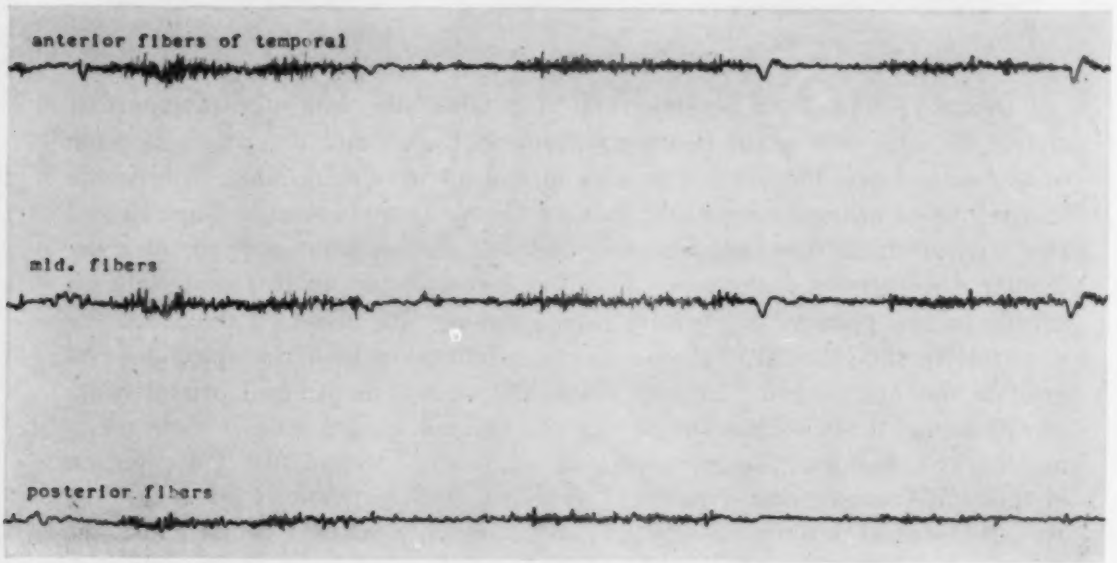

Fig. 16.—K. L. J. Depression and elevation of mandible after orthodontic therapy.

16). Comparison with the normal (Fig. 6) was satisfactory and showed that normal function of the musculature had been restored by orthodontic therapy. It should be noted that in this type of case the muscular dysfunction is a *result of* tooth displacement. Oftentimes tooth interferences must be removed before mandibular positioning is attempted. In the case illustrated (K. L. J.), the teeth which caused the posterior positioning had long since been exfoliated; however, the muscle reflex pattern remained.

Group 2.—Figs. 17 and 18 show lateral cephalostatic roentgenograms before and after treatment of P. C., a typical group 2 subject. In this case, as in the others of this group which had been completed, no great change was seen in the electromyograms after treatment. The posterior temporal fibers continued to display the greatest spikes, and the mandibular elevators remained significantly stronger than the depressor. The mental muscle apparently had decreased in actual size, although there was no method of checking the change in the strength of its action potentials. These findings bear out the suspicion that in cases of this type (mandibular retroversion with maxillary anterversion) the muscle dysfunction was etiologic to the dentofacial dysplasia. This is in contrast to the previous group in which the muscle dysfunction was a result rather than a cause. Apparently what happens in these cases is that in order to obtain correct interdigitation of the teeth the mandible is moved forward to such a degree that a strain is put on the temporomandibular musculature. This would mean that most of the muscle should show strain spike potentials. If these exist, we were unable to differentiate them. The posterior fibers would be stretched the most and would still appear as giving the greater spikes. Repeated efforts to find a mandibular closure path which would give normal electromyograms have resulted in failure. Since the same or similar muscular imbalance persists, for some time at least, after treatment, the necessity for adequate retention is given proof by these findings.

Group 3.—Electromyograms after active treatment showed that orthodontic therapy had caused a muscular imbalance in the temporal muscle. This occurred because the mandible had been moved forward to secure adequate dental interdigitation. Tracings of the cephalostatic roentgenograms bore out the fact that maxillary teeth had not been moved posteriorly to an appreciable degree. The posterior fibers of the temporal muscle seemed the only ones affected, and they demonstrated a behavior not unlike that seen in the cases of group 2 prior to orthodontic treatment, i.e., a constant state of contraction to a greater degree than the rest of the same muscle. None of the group 3 cases were studied electromyographically for a period longer than eight months.

Group 4.—The chance for a normal muscular picture after therapy in these cases apparently depends upon the amount of forward drifting of the maxillary teeth. No case in this group had been observed over a period exceeding six months, and the total of only three cases negated reporting any more than apparent tendencies at this time.

Fig. 17.

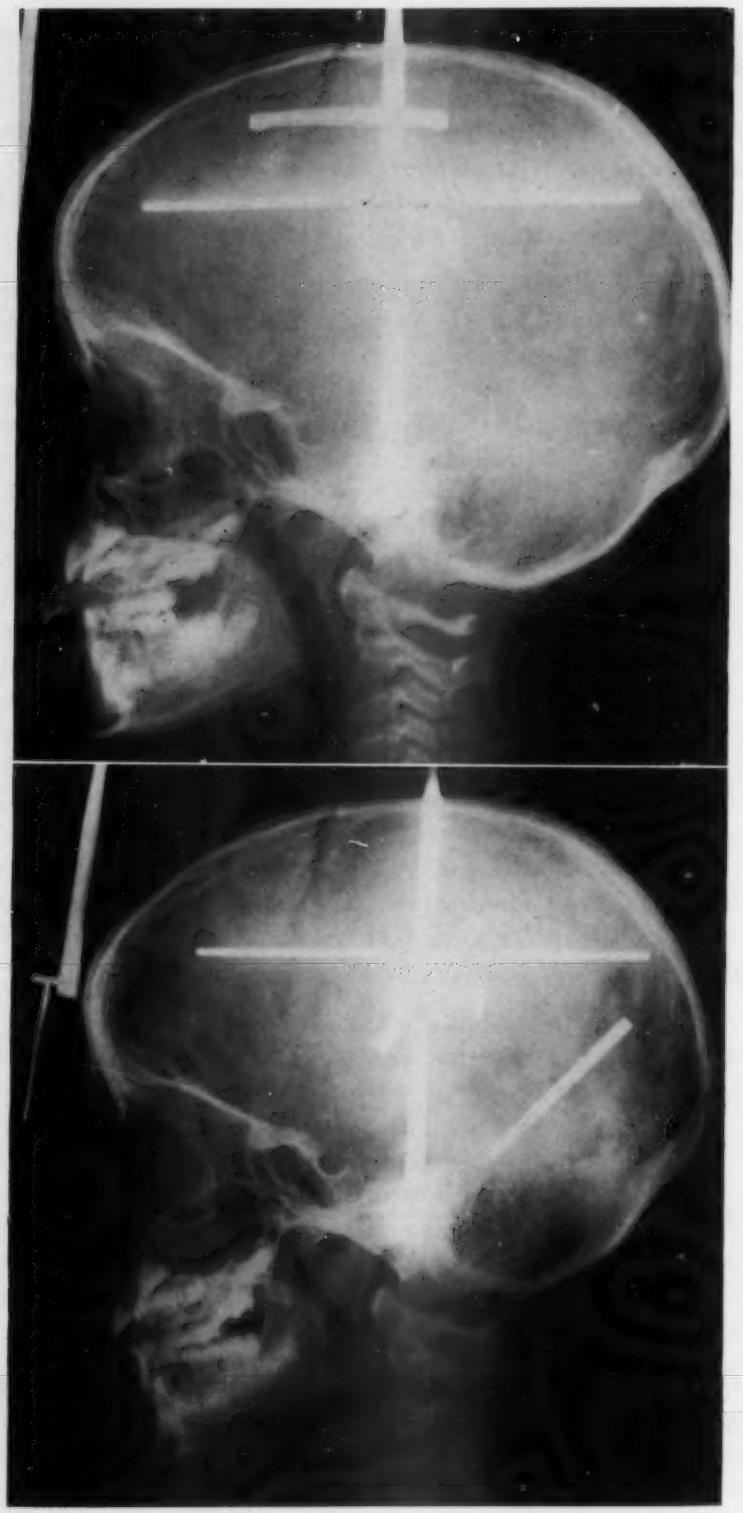

Fig. 18.

Fig. 17.—Lateral cephalostatic roentgenogram of P. C. prior to orthodontic therapy and at the time of the electromyograms in Figs. 11 and 12.

Fig. 18.—Lateral cephalostatic roentgenogram of P. C. after orthodontic therapy.

DISCUSSION

Methodology.—Some work was done on a similar apparatus (Grass eight-channel electroencephalograph) equipped with a magnetic writer. This type of writer was not found to be sensitive enough in the frequency range of most muscle contractions, and therefore the crystographic set-up was used. The literature is full of discussions concerning the alleged superiority of each of the various electrodes.[18, 59] It seems apparent that the choice of electrode is dependent upon what is desired. The surface electrode gives a better picture of the muscle as a whole, while the concentric dipolar needle electrode can be used in such a refined manner as to interpret single-motor units. Each has its advantages and limitations, but more will be learned about any given muscle by study with several different types of electrodes.

The classification of the subjects was done since any orthodontist follows a similar procedure in his analysis of the case prior to treatment. The fact that the muscle patterns were roughly similar for the groups thus classified was sheer coincidence. Three subjects were dropped during the course of this work due to difficulties in cooperation as subjects. The cases reported are not the only cases thus far studied by this method. They are those with sufficient collected data for reporting at this time.

Findings.—The repeated emphasis on the temporal muscle is not to be interpreted as meaning that it is the only muscle displaying aberrations in function. However, its changes are the most obvious, have significance clinically, and are the most easily studied.

The chief clinical value of these studies to date, it seems, lies in the observed differences in muscle patterns among cases ordinarily classified and treated alike by the orthodontist. Electromyographic findings challenge the philosophy of treating all Class II, Division 1 cases in the same arbitrary manner. Just as Downs[22] pointed out that osseous dysplasias in different areas may lead to a similar dental arrangement, so patients with the same orthodontic classification may present radically varying muscle patterns. And as Downs emphasized the importance of appreciating the whole picture of facial growth, so these findings tend to emphasize the importance of understanding the entire tissue response to muscle dysfunction. This includes not only tooth positioning, but also the response in the articulation, bone, and associated muscles. It is not improbable that further electromyographic studies may shed light on the problems of retention and therapeutic extractions. A few cases of maxillary anteversion in which extractions were undertaken are now being studied electromyographically. They are not yet ready for reporting, but there is as yet no indication that this extraction procedure provided a blanket method of restoring normal muscle function in these cases. These studies may, however, give us a lead as to which, if any, cases are good and which are poor extraction risks.

Thompson's[63, 64, 65, 66, 67] interesting findings are confirmed to a great measure by this study; however, the concept of a fixed physiologic rest position of the

Fig. 17.

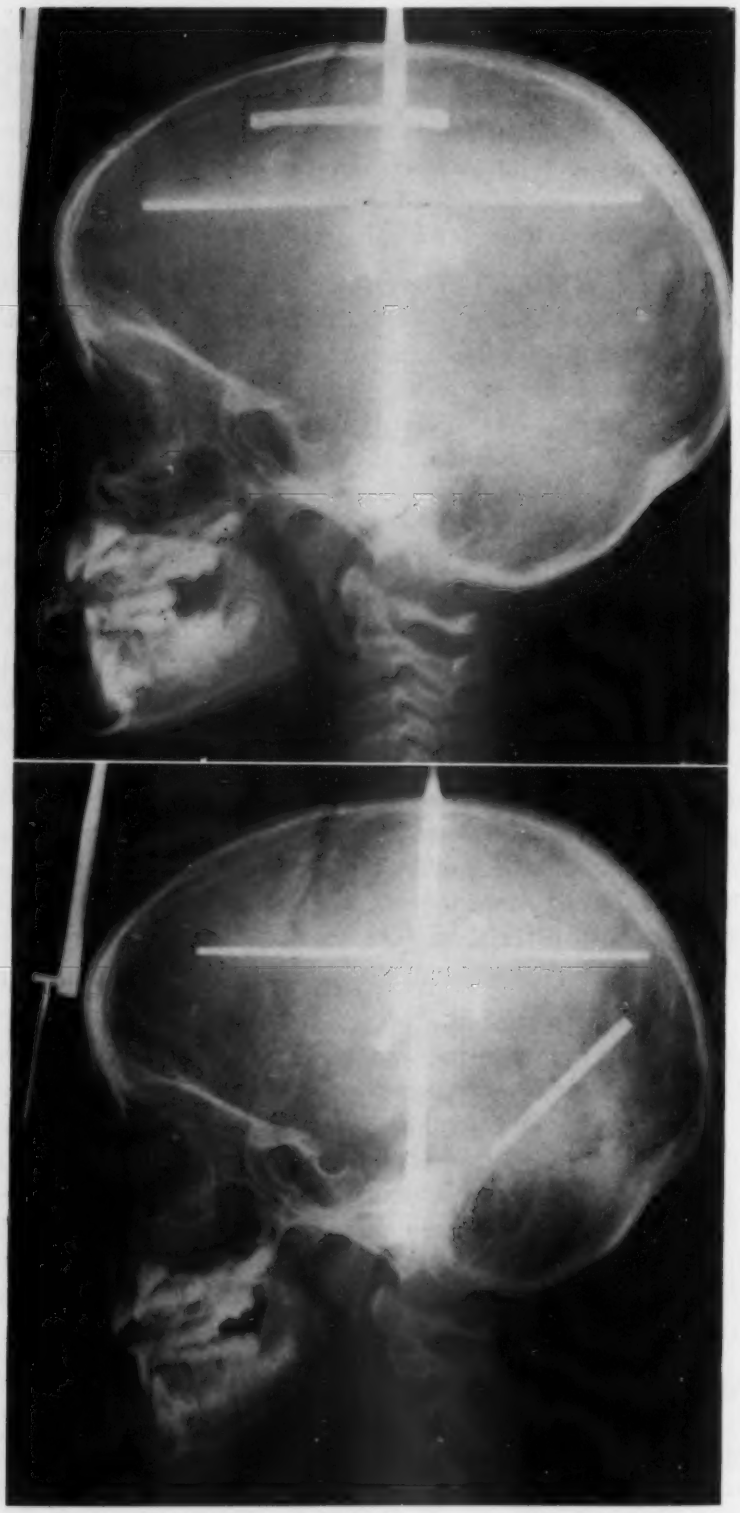

Fig. 18.

Fig. 17.—Lateral cephalostatic roentgenogram of P. C. prior to orthodontic therapy and at the time of the electromyograms in Figs. 11 and 12.

Fig. 18.—Lateral cephalostatic roentgenogram of P. C. after orthodontic therapy.

DISCUSSION

Methodology.—Some work was done on a similar apparatus (Grass eight-channel electroencephalograph) equipped with a magnetic writer. This type of writer was not found to be sensitive enough in the frequency range of most muscle contractions, and therefore the crystographic set-up was used. The literature is full of discussions concerning the alleged superiority of each of the various electrodes.[18, 59] It seems apparent that the choice of electrode is dependent upon what is desired. The surface electrode gives a better picture of the muscle as a whole, while the concentric dipolar needle electrode can be used in such a refined manner as to interpret single-motor units. Each has its advantages and limitations, but more will be learned about any given muscle by study with several different types of electrodes.

The classification of the subjects was done since any orthodontist follows a similar procedure in his analysis of the case prior to treatment. The fact that the muscle patterns were roughly similar for the groups thus classified was sheer coincidence. Three subjects were dropped during the course of this work due to difficulties in cooperation as subjects. The cases reported are not the only cases thus far studied by this method. They are those with sufficient collected data for reporting at this time.

Findings.—The repeated emphasis on the temporal muscle is not to be interpreted as meaning that it is the only muscle displaying aberrations in function. However, its changes are the most obvious, have significance clinically, and are the most easily studied.

The chief clinical value of these studies to date, it seems, lies in the observed differences in muscle patterns among cases ordinarily classified and treated alike by the orthodontist. Electromyographic findings challenge the philosophy of treating all Class II, Division 1 cases in the same arbitrary manner. Just as Downs[22] pointed out that osseous dysplasias in different areas may lead to a similar dental arrangement, so patients with the same orthodontic classification may present radically varying muscle patterns. And as Downs emphasized the importance of appreciating the whole picture of facial growth, so these findings tend to emphasize the importance of understanding the entire tissue response to muscle dysfunction. This includes not only tooth positioning, but also the response in the articulation, bone, and associated muscles. It is not improbable that further electromyographic studies may shed light on the problems of retention and therapeutic extractions. A few cases of maxillary anteversion in which extractions were undertaken are now being studied electromyographically. They are not yet ready for reporting, but there is as yet no indication that this extraction procedure provided a blanket method of restoring normal muscle function in these cases. These studies may, however, give us a lead as to which, if any, cases are good and which are poor extraction risks.

Thompson's[63, 64, 65, 66, 67] interesting findings are confirmed to a great measure by this study; however, the concept of a fixed physiologic rest position of the

mandible can be clarified. This position is an expression of the functioning length of all the muscles of the temporomandibular articulation. How much it is and can be altered, e.g., by the use of intermaxillary elastics, is now being studied electromyographically. If Thompson and Brodie[67] visualized a fixed mandibular position not ordinarily altered with age, they were probably correct. Certain cases in this study (group 2) resisted change in muscle function pattern. Others readily adopted new neuromuscular patterns with a resultant change in mandibular rest position. However, orthodontic intervention was necessary to bring about these changes.

Thompson[66] spoke of "true Class II malocclusions" as differentiated from those cases with simply a Class II relationship of teeth. This is a most important concept. He said with regard to the etiology of the true Class II cases, "The etiology may be in genetics or at least a disproportion of parts referred to by Wylie, Elsasser and Brodie." The findings of this study suggest inherent imbalance of the temporomandibular musculature, particularly the temporal muscle, as an etiologic factor since most "true Class II cases" display temporal dysfunction.

The use of electromyography as a routine clinical diagnostic procedure is not anticipated due to the tremendous amount of time and money spent in gathering data. However, it does provide us with a highly scientific method of probing the physiologic functions of a region of interest to all orthodontists. It is not necessary to take a periodontal section for microscopic study each time a tooth is to be moved. Yet this procedure had to be undertaken before the physiologic processes involved could be fully appreciated. So, too, observing the changes in electrical phenomena of muscle contractions in research subjects will enable us to appreciate better what happens to patients under treatment.

Future electromyographic studies might well provide information about the etiology of gross mandibular anteversion, overbite, and unilateral malocclusions. In addition, the method can likely be used for studying facial paralysis, attainment of "centric relationship" in prosthetic procedures, restoration of vertical dimension by prosthesis, and may have use as a gnathodynometer.

CONCLUSIONS

1. No cases of Angle Class II, Division 1 malocclusion demonstrated completely normal spike potentials from the temporomandibular musculature.

2. The electromyographic patterns permit classifying the cases into four rather loose groups.

3. Orthodontic therapy can alter the character of the spike potentials in certain muscles of the temporomandibular articulation.

4. Aberrations in muscle function pattern can result from malocclusion of the teeth.

5. Inherent deviations from the normal or expected type of muscle contraction may be indicated for consideration as an etiologic factor in the formation of Class II, Division 1 cases.

SUMMARY

An electromyographic analysis of the temporomandibular articulation of sixteen cases of Angle Class II, Division 1 dentofacial deformity is presented. A comparison with the electromyographic findings in a similar group of subjects with normal dentofacial development is made. Changes in electrical phenomena in the temporomandibular musculature as a result of orthodontic therapy are also reported.

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Editor's Preface

The following is an interesting compilation on the subject of economics by Dr. Harry Sorrels, of Oklahoma City, Oklahoma, and is published by popular demand.

The paper was edited by the Economics Committee of the Postgraduate Orthodontic School, University of Kansas City. It is of added interest because it is designed as an indoctrination or a briefing proposition for young dentists about to embark into practice of the specialty of orthodontics subsequent to graduate work.

The paper reflects much thought, time, experience, and even research upon the subject of orthodontic economics, and it covers many angles of the practice as a specialty. It is thought that this material written in an interesting, informal vein will be of great interest to the readers of the American Journal of Orthodontics.

Dr. Sorrels has compiled much statistical information in the past in regard to the practice of the specialty of orthodontics, and his work has done much to bring about more standard methods of handling this type of dental practice.

Readers will recall an editorial that appeared in the July, 1949, issue of the Journal "Orthodontic Tolerance," which had to do with the transfer of cases that was inspired by reading the following monograph.—*H. C. Pollock.*

ORTHODONTIC ECONOMICS

Edited by the Economics Committee, Postgraduate Orthodontic School, University of Kansas City, College of Dentistry, and the Kansas City-Western Dental College

Harry H. Sorrels, D.D.S., Oklahoma City, Okla.

PREFACE

IN AN attempt to give you a basic understanding of many of the socioeconomic problems incident to pursuing successfully the art and science of orthodontics, we have prepared for you a group of letters propounding the questions that seemed most pertinent.

The questions are presumed to be written by you, the student, called "Dick," to an anonymous brother, "Tom," who has been in successful practice for twenty-five years.

In this manner a pointed approach can be made on a pointed problem which, while still not complete, will give you a basic groundwork to expand your own business acumen.

Very sincerely,
Economics Committee.

Dear Brother Tom:

As you know, I am about to finish my postgraduate course in orthodontics, and I believe I am now pretty well qualified to practice in that field.

Drs. White, Nagamoto, Calmes, Closson, Richmond, and Thompson have given unselfishly of their time and talent, for which we are all grateful; however, Tom, my mind is now beset with the complex worries of locations and practice management. Therefore, I hope you will find time to write me a separate letter on each of the following matters. I can then assemble them, and with such other material as I pick up, I shall at least have a working example.

I shall deeply appreciate all this, for I know you have learned much in your twenty-five years of practice that should help me immensely.

The subjects I should like covered follow:

1. What is your idea about locations? Supply and demand problems?
2. Are there any special points of social and professional relationship I should follow after locating?
3. Since I am going into practice, I guess I am also going into business. Are there some pointed observations on this?
4. What fees should I charge?
5. What is the basic foundation of fees?
6. What should I do about fees for physicians and dentists?
7. What points shall I cover in my consultations?
8. If I should have the good fortune to have some business, how many cases can I handle?
9. What would you look for in a secretary-assistant?
10. Can you give me a few more points on what I should look for in a Secretary-Assistant?
11. Since the principal objection to orthodontic treatment, from the standpoint of the patient and general practitioner is the cost, why are not lower fees indicated?
12. In accepting transfer cases, should an initial starting fee be charged if your treatment plan and appliance construction follow that already instituted?
13. Should a starting fee be made if your treatment plan and appliance construction differ from that already instigated?
14. Approximately what percentage of the gross income of the average orthodontic practice is required for the total operating expense? (Salary of orthodontist not included.)
15. When specialty laws exist in a state, what are the restrictions on announcement of office opening?
16. Give the advantages and disadvantages of charging for orthodontic examinations (such an examination to include cost, x-ray survey, photographs, and so forth) during the first year of practice. Is such an examination indicated prior to giving estimated length of treatment and quoting entire cost of service?

Sincerely,
DICK.

P.S. Tom, if you have time will you kindly add to the above a brief, philosophical premise for me to live by.

Dear Dick:

I have your good letter requesting a letter on the orthodontic supply and demand or location problem, and it is about as follows: (Side note: The same ratio follows all over the United States.)

Texas has about eight million people.

Oklahoma has about two and one-quarter million people.

Kansas has about two million people.

Arkansas has about one and one-half million people.

Louisiana has about two million people.

Kansas City metropolitan area has about three-quarter million people.

In other words, there are about seventeen million people in the Southwestern area, of which one-fifth are children or nearly three and one-half million children, with probably one-half of them needing some orthodontic care, or one and three-quarter million children. Divide this into one hundred bona fide orthodontists practicing in this area, and you have about 17,000 potential cases for each orthodontist.

Now each orthodontist can't conceivably handle over three hundred cases of all types at one time, so you can see that we are only scratching the surface of the potential; therefore you can rightfully say any place almost is a location.

That covers the need, but there is, of course the demand angle, and at present it is greater than the supply of orthodontists, due to the educated desire being good, plus an economy that permits the expenditure for this service.

Now getting down to more pointed situations, you can say this—an orthodontist is needed for about every one hundred thousand people, which then would give a ratio of children to orthodontist of 20,000 to one, and if one-half needed help, 10,000 potential instead of present 17,000, which would more closely meet the demand.

What does this mean? It means, any community with 100,000 people would be a location. Now, where are the best locations? That, of course, depends on a lot of factors, namely:

1. Present number of orthodontists in a community per population.
2. The ages of the practitioners.
3. How long since there has been a new man or men.
4. Assimilation possibilities.

Questions you could properly ask:

What are the possibilities of virgin territory? Answer, splendid.

What is the mortality of orthodontists? Answer, probably 4 per cent per year. Good chance here to buy or pick up established business.

For your information, but avoiding the mention of cities or towns, I would say there are a dozen splendid locations in the Southwest; many towns have none where they need one; one-man towns where they need two; two-men towns which need three; it is in the larger cities where there now is the greatest concentration, and while they can assimilate a new man ever so often, they shouldn't grow too fast in numbers if all are to do well.

Sincerely,

TOM.

Dear Dick:

Yes, I think there are several points on social relationship I believe could well be mentioned to you.

Out of deference to you, as well as to all orthodontists and orthodonties, there are certain rules of conduct becoming you, for your conduct and that of your colleagues in orthodontics is what creates the whole of the public's impression of the science.

As a citizen, you should, of course, reflect your good breeding by cooperating as much as your time permits in all civic, church, and community affairs.

As a dentist, you should immediately become a member in good standing in your local state and national dental associations, contributing generously to their welfare. You should accept within reasonable bounds any and all committee duties you are assigned and further, do a good job on them; however, never seek personal glorification out of them. If that should come in the way of honors of office, let that be the sequel of jobs well done, rather than for any personal agrandizment.

As an orthodontist, you should always follow the Golden Rule in your every relationship with fellow orthodontists and in your treatment of the public.

There are a few "Do's" that we can well enumerate here, and they follow:

1. Always remember your colleague's right to practice also.

2. Join your orthodontic societies as soon as eligible for admittance. Most societies demand three years' exclusive practice before you are eligible for admittance; however, most of them give you credit for the time you spent in postgraduate study.

3. Always remember to give your patients your very best effort. Give nearer thirteen eggs for a dozen, rather than eleven.

4. Subscribe to the fee conditions of your community. I would say that for your first few years in practice, you could and probably should contract your cases for less than the old, established practitioners, but never too much lower. (I shall write more about fees in a later letters.)

5. Respect fees on transfer cases, unless they are too ridiculously low.

6. Always consult with your dental friends on their cases and, further, respect their observations.

7. Consult with your medical friends—respect their observations.

8. Always speak respectfully of your orthodontic colleagues.

9. Always commend your colleague's appliance therapy, even though you would treat the case differently. You can change it later to suit your approach without any fussing or fuming.

10. Always follow the Golden Rule and you won't go far astray.

Best wishes,

Tom.

Dear Dick:

This is letter No. 3 and is titled: "So You're Going Into Practice and Yes! You are Also Going into Business."

Whether or not you like to think of it in this way, it is the truth. *You* are going into business.

You will have an overhead, a telephone, secretary, bookkeeping system, typewriter, and all necessary implements of business, so you definitely are in business. Therefore, a few academic points on business are in order in starting your own practice:

1. Going into business is easy; there is no trick to it at all. Hundreds of people do it every day all over the country.
2. Staying in business is something of an accomplishment when records show seven out of ten fail.
3. Growing in business is an achievement.
4. Being in business means you sell your product or service direct to the consumer instead of to an employer.
5. Every business must do one of these or all—make something, sell something, or perform a service that is marketable.
6. What you have to sell must have one or more of these advantages over comparable products in the market with you:

    A. Be a better product.
    B. Be cheaper, or
    C. Sell it more effectively.

Who succeeds in business? Men with ambition, initiative, and enterprise; men of this type with enough daring and resourcefulness to operate under their own steam and create their own opportunities; those who are too independent to lean on others for jobs. Someone has said success is 50 per cent inspiration and 50 per cent perspiration—about true; however, there are many other points needing consideration in any vocation.

7. Choice of occupation:

    A. Must have marketable material.
    B. Must have marketable service.

8. Preparation of yourself by employment in kindred jobs.
9. The outlook of your business:

    A. Present need.
    B. Present demand.
    C. Future need.
    D. Future demand.

10. What are possible advantages and disadvantages of vocation of choice:

    A. Hours.
    B. Seasonable or yearround.
    C. Nature of surroundings.
    D. Health and accident hazards.
    E. Effects of depressions and booms.
    F. A necessity or elective.
    G. Security of your business.

11. Personal qualifications:

The more carefully businessmen are studied, the more evident it is that they succeed largely for the same reasons. The factors that make for success have again and again been found to be what people call personality or the ability to get along with people favorably.

Such traits of character needing attention are:

A. Sincerity
B. Tact.
C. Honesty.
D. Reliability.
E. Determination.
F. Perseverance.
G. Vision.
H. Courtesy.

Something to think about:

I am a little thing with a big meaning.
I help everybody.
I unlock doors, open hearts, dispel prejudices.
I create friendship and good will.
I inspire respect and admiration.
Everybody loves me.
I bore no one.
I violate no law.
I cost nothing.
Many have praised me; none have condemned me.
I am pleasing to those in high and low degree.
I am useful every moment of the day.
I am courtesy.

You can say that all those characteristics that are attractive to others and that arouse admiration and trust are the ones that will win.

The person who has these characteristics in a large degree will get ahead faster than his fellow man who has them to a lesser degree, even though the latter may be more proficient in doing the job itself. The business or professional man who has them gets along faster and farther, other things being equal, than the man who lacks them.

12. Education and training: The more complete your training for any job, the more advantages it will give you over the other fellow in your quest for success; how thorough was your high school training, your college training as to your postgraduate training. I would say this has been excellent and further, I am giving you tips in these letters to expand further your business acumen, so that you will be, I hope, better qualified in this important angle also.

Other requirements, as stated before, are your associations after you enter practice. Join all of your professional associations and never stop studying.

Remember also—*the value of a service is long remembered after its price is forgotten.*

Best regards,
Tom.

Dear Dick:

Letter No. 4 is dedicated to that most important question, "Fees."

This unmentionable is one of the subjects that *must be mentioned* since you cannot conceivably be a success as a financial failure, for you, too, have social and economic responsibilities that must be met.

Let me further say this, present orthodontic fees have been acceptable to the public for about forty years, so I would immediately admonish you not to become revolutionary in your thinking on this subject. I mean by that, I would urge you to accept the established fee range in the community in which you establish your practice, rather than assume a low fee basis or a higher basis, for there has been a lot of years of mind-conditioning of the public that you cannot quickly change.

If you were to be real cheap, the public would assume you to be no good; if you are too high, they will wonder who this upstart is that thinks he can do this to us. Therefore, let us rationalize this and make whatever changes there need be in a slower manner.

For your first few years in practice, however, I would say you can justifiably quote your charges for about 20 per cent less than the old, established practitioner, if the fees of that community are what might be considered fair. If, however, you go into a low fee community, I should urge you to stay on a level with the best men.

On the present market I would say the following fee range is typical:

The better fee range is:

Four hundred dollars or better the first year;
Three hundred dollars or better the second year; and
If a third year is quoted, about two hundred dollars.

The medium fee range is:

Three hundred fifty dollars the first year;
Two hundred fifty dollars the second year; and
If a third year is quoted, about one hundred dollars.

The low fee range is:

Two hundred fifty dollars the first year;
One hundred eighty dollars the second year; and
Around one hundred dollars for a third year, if it is quoted.

I will admit there are a few areas wherein they even go below this, but they are few and should, by any sound consideration of economic principles, be assumed to be tragic orthodontic economics.

Suffice this to be only an introduction to the fee angle, for I shall cover in my next letter the basic reason or justification of your fee.

Very sincerely,
Tom.

Dear Dick:

Your next question was, "What is the basic foundation of fees?"

Well, Dick, I still remain somewhat confused as to what an orthodontist is really worth to his community. Is it twenty thousand dollars per year, or is it ten, or five? That question is, I believe, to a degree precluded for us in what value the public puts on our services.

In other words, I deeply believe in the law of supply and demand, believing it to be the Alpha and Omega of economics, for if anything is too plentiful its value diminishes; if it is a scarce article with a big demand, it goes up.

This condition, however, is frequently placed under a degree of control by big business, business monopolies, and government controls of needed supplies and price controls, or in proper distribution of those agencies rendering a service. Further, I am sure we also must conscientiously appraise this angle also.

I believe, however, I had better stay off this difficult angle and get down to the case at point.

The basic foundation of your practice will, of course, be your cost of production, but first let me say you won't be able to produce over 1,500 productive hours per year. Let us look at the situation briefly to see how we arrive at this figure.

There are 365 days in a year, of which there are the following allowables taken off:

52 Sundays
26 days off (one-half day a week)
14 vacation days
14 days for conventions
9 days off for illness, etc., etc.
115 days out of practice

365 days in a year
Subtract 115 days
You have 250 working days
Now, you can only produce 6 hours production per day;
therefore, 1,500 productive hours per year, or 125 per month.

Now, if your office has an overhead of $500.00 per month, the cost of doing business for 125 hours will be $4.00 per hour. If you are going to stay in practice, or in this instance stay in business, your office will have to merchandise its services for more than $4.00 per hour. Now, if you add your living cost for your home on to that, and say you need $250.00 to get by on, then your hourly selling price must be $6.00 per hour. If you have to have $500.00 at home, you will need produce $8.00 per hour. If you need $750.00 per month at home, your production department must sell its services for $10.00 per hour, and so on and on as the demand for your services increases. But remember this—you cannot stay in practice and sell for less than your cost per hour minimum, which will likely be around $6.00 per hour.

This, I believe, must suffice for this point, even though it has many other ramifications, some of which will be discussed in later letters.

Best wishes,
Tom.

Dear Dick:

The question for this letter is, "What should I do about fees for physicians and dentists?"

Sentiment here will throw you, if you don't watch out, for you will likely feel like doing many of these cases for nothing, and a few you will for those close intimates in the professions, but you must take care for you can only put about one case under treatment a week, and this group can easily grow to extreme proportions.

Since I have mentioned that you can only start about one case a week, I believe I had better clarify that a little, and what I mean is this. Once you get your practice rolling and have a full practice, one new case a week is about all you will be able to handle, and, further, that means you will need dismiss a case a week also, to keep the bucket from running over.

Now back to the real point. That will need be for you to decide, and there will be exceptions to all rules, but your rule should be about as follows:

10 per cent off for physicians, dentists, and clergy who live a long way off and contribute nothing to your practice welfare.

20 per cent off for physicians and dentists in the immediate proximity of your practice who contribute a little to your welfare.

50 per cent off for physicians and dentists who contribute generously to your welfare.

No charge to your very, very dearest friends of the professions, or if any charge, just a token charge for appliance cost.

This probably sounds inconsistent and predicated on too much of a mercenary basis and possibly it is, but all friendships are based on one thing and that is, each of you give something to the other wherein equity is served or there just can't be friendship. Sometimes it is just a smile, or a jolly greeting plus affability, or kindred interests, but believe me there is a trade made.

Now as to these mentioned per cents off, *you* must be the one who decides who is who here. You are the dealer, and if they don't agree to play the hand as you deal it, then you can't play the hand either.

Sincerely,
Tom.

Dear Dick:

"What points shall I cover in my consultations?" is letter No. 7, or it might be called, "What does the parent or patient want to know about his or her case?"

Frankly, there aren't too many questions, but here they are in the approximate order of their thinking, and it must also be your thinking in appraising the case:

1. Do we have a problem?
2. If so, can it be corrected?
3. How well can it be corrected?
4. How long will it take?
5. How often do I have to return for treatment?

6. Will the braces show?
7. Will braces cause cavities?
8. Will the braces hurt?
9. How much will it cost?
10. How can it be paid?

Dick, if you will follow this outline and then ask them if there is any other point you have overlooked in your discussion, I am satisfied other questions will be few and far between.

I further want to make this observation at this point—there will be times when you must hurry through a consultation, and I urge you to use the above approach, asking the parent to permit you to ask these questions of yourself, and then give the answers. In this way you can cover all the territory of a consultation in a hurry, rather than permit them to digress all over the subject at random.

You can state it this way:

"Now I am sure there are about ten questions you want to know about, but if you will permit me, I shall propound the questions, then answer them, and we can cover the subject rather completely in a short time; then if there are other questions you want answered, I shall be glad to answer them."

Dick, I must close for this letter, but I shall go on tomorrow with other points.

Regards,
TOM.

Dear Dick:

Your listed question for letter No. 8 is, "If I should have the good fortune to have some business, how many cases can I handle?"

Well, Dick in letter No. 5 I stated, and it has been agreed by practically all students of dental economics, that you cannot produce over 1,500 productive hours per year, so let's predicate our analysis on that.

Now let me add this—I said in letter No. 1 that no orthodontist could handle over 300 cases at one time of all types, active, under retention, and consultations, so let's look at the figures.

Let us say he can do this:

Have 75 active cases at any one time, which will take above 20 hours each per year, this would be 75×20, or	1,500 hr.
(Your time already is all gone.)	
You have 125 under retention at 2 hours each per year, 2×125, or	250 hr.
You have 100 consultations at 30 minutes each	50 hr.
Or a total of	1,800 hr.

which will work the daylights out of you.

Now, all this should dispell the idea that you can handle volume, so your fee range must be predicated on the above.

Sincerely,
TOM.

Dear Dick:

When your letter arrived asking for aid and guidance in the "Selection of an office secretary-assistant" for your newly activated orthodontic office, I must confess that a feeling of inadequacy came over me to try and answer your request. Since the importance of making a wise choice is surpassed only by the difficulty in doing so, and while the problem is an individual one, I shall try and answer you with generalities that I hope from which you may glean the information that you desire.

Digressing for the moment from the essence of this letter, let's consider the individual to whom it is directed—you. In order for you to select successfully the right person to help you in the conduct of your practice, it would be wise to analyze qualitatively your own personality first and draw from this a cross section of your own make-up to use as a guide in interviewing applicants. It has long been a known physical fact that rarely do incompatibles compliment each other, and although there is an adage to the effect that opposites attract, I believe this phenomena can best be left to the field of nuclear energy, and in our offices an attempt be made to select a person of like disposition to complete our staff. If you are a person of quiet demeanor, it would certainly be a mistake to hire a garrulous individual to assist you.

Since your practice is primarily with and for children, an almost needed prerequisite should be that the person you choose likes and understands the age group that you will be working with. It will be difficult to determine this in an interview, so perhaps the best way to find this out would be with a direct question. In so doing you will show the applicant that you are expecting frank and honest answers from her.

The question may arise in your mind, "Which is better to hire, a single girl or one who is married?" Again, I feel the answer is in the individual and her position. Whatever her status, for your sake it would be better if it were more or less static, and not too open to change. Educational background is important. Business training may not necessarily be required, but if it is possible to obtain a person with it who meets your other requirements, then you will be able to relieve yourself of much of the business management of the office and can devote your energies primarily to the practice of your profession.

Appearance of the applicant is important. By this I do not mean the clothing that she wears must be from an expensive shop, but it should be in good taste and in some manner aid and abet the personality of the individual. Another key to a successful choice is in finding the reasons for her working, why she is wanting to work in your particular office, and her honest opinion if she feels that in talking with you she still wants to come in and help in the building of a practice.

Previous experience may or may not be an asset. If she has worked for a great number of other practitioners, certainly it would be wise to find out what was the reason for termination of such employment; also, a little knowledge may be a dangerous hazard to your training her to the ways you want your office run.

In closing, Tom, let me caution you not to be too hasty in the selection of your reception room ambassador. Take plenty of time before you pick the person that is going to man your front line of offense. Many times your first contact with a new patient is over the telephone, and your assistant answers it when it rings. To borrow a phrase, remember that before you can put an appliance in the patient's mouth, you must first put a patient in the chair.

Best wishes,
TOM.

P. S. This question and this letter were favored me by my colleague, Earl, and are a splendid contribution on this point which needs your attention, Dick.

Dear Dick:

In looking over my last letter to you about "What would you look for in a secretary-assistant?" I find I have made five points, namely:

1. Like temperament!
2. She must be compatible with children!
3. She must be neat in appearance!
4. She should need to work!
5. She should be an adequate business person—good bookkeeper a requisite!

Those points I am sure are definitely essential, but since thinking this through, I believe I should add a few more, namely:

6. She must have pretty teeth!
7. She should be of smaller stature than you (or you would be physically dwarfed).
8. She must have good health! (A physical examination would be in order.)
9. She must be a good housekeeper!
10. She must be enterprising!
11. She must have a good disposition (whether you do or not)!
12. If you are a real young person, you should hire an older person; if you are reaching the sunset of life, you should have a younger person; if middle-aged, age will not make too much difference.

These points I feel should definitely be sought for in your ambassador in the front office.

After much trial and error in this field, I have worked out an application blank, which I feel would be of some aid to you, so I am sending it along as a sample for you to use, if you see fit.

Sincerely,
TOM.

P. S. Another point—in hiring someone, I should urge you always to hire her on a trial of, say, two months. It can be a trial also for you. Maybe she won't like the work and you may not want her either.

APPLICATION BLANK

DOCTOR TOM _____

NO. _____
Telephone

Name _____
Home Address _____
City Address _____
Whom do you live with? _____

EDUCATION:
HIGH SCHOOL: _____

COMMERCIAL EDUCATION: Bookkeeping _____
Shorthand _____
Typing Speed _____
English (spelling & punctuation) _____

PREVIOUS EMPLOYMENT _____
_____

NATURE OF WORK _____

Married _____ SINGLE _____ DIVORCED _____ CHILDREN _____

What are your hobbies? _____

ARE YOU ENGAGED? _____ PROSPECTS _____

CHURCH _____ WILL YOU LIKELY BE PERMANENT? _____

SALARY MINIMUM _____ FUTURE SALARY _____

Are you willing to spend one evening per week in the furtherance of your education with respect to this position? _____

AGE _____ WEIGHT _____ HEIGHT _____

GENERAL APPEARANCE _____ NEATNESS _____ TEETH _____

GENERAL HEALTH _____

CHARACTER REFERENCES:
(DO NOT GIVE RELATIVES) _____
_____
_____
_____

HAVE YOU EVER BEEN BONDED? _____

DESIRABILITY: EXCELLENT ____ FINE ____ GOOD ____ MEDIUM ____ POOR ____

NOTE: All employees of a dental office should have fine, well-cared-for teeth, even if artificial.

Dear Dick:

I have your letter expressing the desire of some of your colleagues or classmates that letter No. 11 be devoted to the question, "Since the principal objection to orthodontic treatment, from the standpoint of the patient and general practitioner, is the cost, why are not lower fees indicated?"

Let me say in the beginning that this is a fine question and deserves a careful answer. I must immediately answer it as follows.

The element of *cost* precludes the sales price, so orthodontics can never be placed on the market just to suit the buyer, for they have no opportunity to know that angle.

As I said in letter No. 5 on "the basic foundation of fees," if you must merchandise your services for six dollars an hour in order to eke out a living, then that must be your minimum consideration, for most cases will take you twenty hours of time in the first year; so if it costs you six dollars per hour times twenty hours, you have a one hundred twenty dollar cost value, and you can't profitably sell for less than ten dollars per hour. Now here is a point you must watch also—I believe the skilled practitioner can produce a result in twenty hours per year, but due to a little less speed and dexterity you will probably take forty hours for the same case, so your cost would be two hundred forty dollars, or forty hours at six dollars per hour.

Yes, Buick automobiles are expensive too, but they don't sell them for less than the cost of a fair profit for all involved in their production, so by the same token, orthodontics cannot subscribe to the whims of the public.

If they feel this, as the question states, then it is a matter of education of the public about it.

Relative to the dentists' feeling we are too high, I don't think they really believe that. I feel it is more that we are in competition for the same dollar, for if the person has plenty of means or plenty of dollars to spend for all classes of dental service, then you never hear anything about this angle.

I do feel, however, that we should never sell treatment to people who actually need that money for more needed health-giving services. That angle should be rationalized with the parent or patient.

In further discussion of this point, let me refer you to a review being given orthodontics titled, "What Does the Public Think of Orthodontics?" This will appear in a forthcoming issue of the AMERICAN JOURNAL OF ORTHODONTICS, and you will find in perusing it that those people who have had orthodontic services feel the cost element to be fair. This question of its being high arises, I repeat, only in the minds of the unconditioned.

I believe this is a good place to elucidate further the point of fees by making this analogy. Only recently I had a consultation with a garage man, and after I had quoted the fee he said, "Good-nite, that is expensive," and I said to him, "Well, I can understand, it does sound expensive, but I dare say if I were to take my car to your garage as often as your child comes here that I would have a higher bill." He saw the point and agreed he probably didn't realize the time, energy, and skill involved.

While this is not such a complimentary comparison, to be compared to the more menial service of the art of mechanics, it does show the point.

Regards,
TOM.

Dear Dick:

Your question No. 12 is, "In accepting transfer cases, should an initial starting fee be charged, if your treatment plan and appliance construction follow that already instituted?"

A positive "No" is my answer. Why should there be?

There is no basis why we should not accept this case and go along without imposing a starting fee on this case, for we must always be fair to the patient and our colleagues alike.

I might add further that if the fee attached to the case is within reason, you should go along with it also. If, however, it is really too desperately low, I think then you could raise the charges to a place where they compare with yours.

I feel this is all right, for there are variable cost angles and values on the operator's time that, of course, should be considered.

I would say a case at point is one in which you transfer one of your cases to a Park Avenue orthodontist in New York; his operating overhead, clientele, et al., preclude the necessity of a larger fee.

Best wishes,
TOM.

Dear Dick:

Your question No. 13 is, "Should a starting fee be made if your treatment plan and appliance construction differ from that already instigated?"

I don't feel there should, for I feel so definitely that we are all playing on a team together, and that we should help one another, which builds the public conception of our fairness.

I don't think much of anything should be said about the appliance therapy of the transfer case, only to say something complimentary that the case is doing well, or that they are nice appliances, etc., even though there is nothing complimentary about the whole deal. Then as time goes on you can effect the desired changes that work better in your hands.

I will grant there are extenuating circumstances when half the appliances are gone or were never placed wherein you can justifiably charge at least part of a starting fee, but as a general rule I would waive a charge on this case also.

At this point let me inject another angle—if I knew a case would be transferred from my office within a few months' time after treatment was planned to start, I would not start the case, urging them to give their new doctor to whom I was referring them, the choice of appliance therapy.

Regards,
TOM.

Dear Dick:

Your question No. 14 is, "Approximately what percentage of the gross income of the average orthodontic practice is required for the total operating expense?"

It is my studied opinion that most orthodontists have a lower operating overhead than our fellow dentists, because of the fact that we do practically all

our own laboratory work. Therefore, we have at least a minimum expense at this point, which is high in the average general practice office.

Of course, in the first months to year of your practice, your overhead will consume a large percentage of your income because your volume income will be meager; therefore, I shall answer your question predicated on a near full practice, since that can be the only fair appraisal of this point.

1. I would say your rent and secretary-assistant should never run over about	20 per cent
2. Materials, telephone, stationery, etc., should not be over	8 per cent
3. Public relations, dental dues, club dues, etc.	2 per cent
4. Depreciation, office fixtures, and equipment replacements	5 per cent
Or	35 per cent over-all

This should always take care of your overhead.

At this point, I would urge you to make the following recapitulation monthly, so you will constantly have this before you:

RECAPITULATION SHEET
(Fictitious figures)
June, 1945

Receipts	$1,800.00
Expenses	600.00
	$1,200.00

Expenses per cent: 33⅓
Number of statements mailed
Amount of statements mailed, accounts receivable

In this way you will have a constant appraisal of your office management before you.

Remember further that Uncle Sam will take about 33⅓ per cent of this also, so for every $3.00 you take in, you will get about $1.00.

Best wishes,
Tom.

Dear Dick:

In reply to your question No. 15, which is: "When specialty laws exist in a State, what are the restrictions on announcing your office opening?"

My answer to this shall, of course, be that you must subscribe and comply to the law of that state; if it has a speciality law, then you must subscribe to its conditions, whatever they are.

I presume you know the states that have such laws, but since we are discussing them, I shall name them. They are as follows: Tennessee, Oklahoma, Michigan, Illinois, Kansas, and South Carolina.

If there should be any questions of clarification of the law, I would urge you to seek the counsel of the secretary of that board, and then, with this advice, anything you do will have his word on it also.

While I don't suscribe in toto to all the provisions of all these state laws, I do to the premise, feeling it to be the best way to regulate the specialities for the public welfare.

While the Professional Boards are good, they are not nearly as good as their proponents think, for truly all they will regulate or bring up to a standard of efficiency are those that want to subscribe, not touching the eccentric, pseudo charlatan, pseudo adventurer, and pseudo quack.

I am, however, a certificate holder of the American Board of Orthodontics and would urge all of you to carry your work forward to a point wherein you too will be certified; for the American Board of Orthodontics is a step in the right direction and one in which we should all morally and actively subscribe.

Sincerely,
Tom.

Dear Dick:

In reply to your question No. 16: 1. "Give the advantages and disadvantages of charging for orthodontic examinations, such examination to include cost, x-ray survey, photographs, and so forth, during the first year of practice," and, further, 2. "Is such an examination indicated prior to giving estimated length of treatment and quoting entire cost of treatment?"

Please note I have broken this down into two questions for convenience of answering, and I shall attempt No. 1 first.

It is my firm conviction that you should charge for consultation services, say from three to five dollars for a clinical or superficial study, which can be appraised rather quickly at one sitting.

I don't feel you will always need to impose the cost of casts, x-rays, and photographs on the case before coming to your conclusion, and neither do the patients appreciate all this. What they want to know, I enumerated to you in letter No. 7. I feel they appreciate this immediate direction of their thinking; also you will be in competition, if we dare call it that, with the old practitioner who, by reason of business volume, has to waive much of this preliminary and get to the point.

I do feel your casts, x-rays, photographs, etc., are all necessary and vital information indices you should have after you start treatment, but I do not feel you will arrive at a much different answer to the problem even with them. You have actually seen more in your clinical appraisal of the patient himself than you will in the casts, x-rays, or even photographs.

You will have been able to check:

1. General physical well-being.
2. Size of tongue.
3. You will have checked habits.
4. Number of teeth, and may other things you won't find additionally in casts, etc.

If you care to do these things—okay; but they will cost you money.

I would urge you to train yourself quickly on this angle of decisiveness. Study all the cases and casts you can in the next few weeks with this thought in mind—make a decision. You won't have to expound to the patient your entire plans—only that it can be done.

Further, you can add that you must have the prerogative of how and if any teeth might conceivably be extracted. They should be told it might be necessary.

There are, of course, times, and many of them, wherein you must slow down, take some x-rays, etc., before expounding at any length, but not as a rule. When this becomes necessary, then they should be charged for this service, but if the case goes under treatment the survey cost can and should be allowed on treatment fee.

I see I have already answered the second question also, so shall not say any more about it per se.

I want to pull out of question No. 2 one point, however, that needs some attention and that is "quoting entire cost of treatment." If you mean by that a fixed fee, let me say, don't ever quote fixed fees. They are economically unsound for someone—either you will get hurt or your patient will. You should quote by the year of each active year, $300, $200, and $100 for any additional year for active, routine service; however, pull the case off active treatment whenever you can, and place it under a passive retention fee, or say on an office call services rendered basis. This makes for fairness, both to you and the patient.

Regards,
TOM.

Dear Dick:

For letter No. 17, which is the last of these letters, you ask that I summarize a little and, if I could, give you a few philosophical premises to live by.

This, of course, is a big asignment, and I hope I can hit on a few pointed angles that will be worthy of your consideration.

If there is only one point I make in these letters, I hope it is this, and that I can make it crystal clear. You are joining a team of about eight hundred bona fide orthodontists or exponents of your art and science, and I trust and hope that you will play your part in this great game by contributing to its usefulness of making man healthier, happier, and, coincidentally, better looking, for your having had a part in the science and art of orthodonties.

I hope you can play the game like Confucius states in these pointed paragraphs:

Confucius says: "In learning and straightway practicing, is there not pleasure?"

"Whom fame cannot vex, is not he a gentleman?"

"Thrice daily I ask myself: Have I been unfaithful in dealing with others? Have I been untrue to friends? Do I practice what I preach?"

"Make faithfulness and truth, thy masters; have no friends unlike thyself; be not ashamed to mend thy faults."

"Not to be known, should not grieve you; grieve that you know not men."

"Look at man's acts; watch his motives; find out what pleases him; can man evade you?"

"To see right and not do it is want of courage."

"What I do not wish to have done unto me, I likewise wish not to do unto others."

Confucius was not only a great thinker, but also a Master Salesman.

May I ask—aren't you joining a team that has something to sell? Okay. Then play your part, for whatever the public conception of orthodontics and orthodontists is wasn't made by the butcher, the baker, or the candlestick maker. It was made by orthodontists, so anything that in any way causes the orthodontist, the dentist, the physician, or the public to look with disfavor on any act of any of us is wrong. We make our own reputation!

May I add further this definition by an anonymous writer:

"The Most Valuable Thing in the World"

"I am the most desirable thing in life. Without me no one can be healthy, happy or useful. With me, the hidden wealth and vast resources of this earth would have no value.

"I am the great developer of man. No other agency has called forth so many of his hidden treasures or developed more power of mind and body than I have. Men and women who try to get along without me are characterless, selfish, undeveloped, useless and unprofitable members of society.

"I am behind every fortune, every art and science, every achievement, every triumph of man.

"Rich men and poor men alike often try to find substitutes for me, hoping thereby to secure to a larger measure of happiness, peace and satisfaction, but they are always bitterly disappointed. Instead of gain, every substitute for me brings them infinite loss.

"As the Creator is greater than the creature, so I am greater than wealth, power, fame, learning or any other acquired possession or quality of man, because I am the source through which he acquired them.

"I am work!"

Happy landing, Dick! My best to you always!

Sincerely,
TOM.

MEDICAL ARTS BUILDING.

In Memoriam

MARK H. PERRIN

1893-1949

DR. MARK HARRY PERRIN, nationally known orthodontist of Topeka, Kansas, passed away Wednesday, Aug. 24, 1949, at a Topeka hospital following a long illness.

Dr. Perrin was born Sept. 15, 1893, in Benton County, Missouri, and spent his boyhood in Kansas City, Kansas. He was a graduate of the Wyandotte High School, Kansas City, Kansas. He received the degree of Doctor of Dental Surgery from the Kansas City-Western Dental College, Dental School of the University of Kansas City, in 1915, and immediately located in Dodge City, Kansas, where he entered general practice.

After service as a Captain in the Dental Corps of the United States Army during World War 1, he attended the International School of Orthodontia. He located in Topeka in 1925 and limited his practice thereafter to orthodontics. A keen student of children's problems in dentistry, he was a charter member of the Denver Seminar, a study club for graduate work.

He held many offices in the various dental societies, and was an indefatigable worker for the advancement of his profession. He was a Past President of the Shawnee County Dental Society and the First Dental Society of Kansas. He was also a member of the Kansas State Dental Association, American Dental Association, American Association of Orthodontists, and the Southwestern Society of Orthodontists. He was a member of the Psi Omega Dental Fraternity and Omicron Kappa Upsilon, national dental honorary society.

Due to ill health, Dr. Perrin retired from practice eighteen months before his death. He had been an active civic worker, and was a member of the American Legion, Rotary Club, Topeka Country Club, and the Grace Cathedral Episcopal Church in Topeka. He is survived by his wife, Mrs. Mattie Lou Perrin, one daughter, and three brothers.

Department of Orthodontic Abstracts and Reviews

Edited by
DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Tooth Size and Occlusion in Twins: By Anders Lundström, Stockholm: A.-B. Fahlcrantz Boktryckeri, 1948. State Institute of Human Genetics and Race Biology, Upsala, Sweden, Prof. Gunnar Dahlberg, M.D., L.L.D.

(An analysis on twins of genetic and nongenetic factors especially for tooth size, tooth space in the dental arches, and the occlusion between the jaws, with regard to etiology of malocclusion and in normal occlusion. 100 identical and 102 fraternal in Stockholm area.)

Dahlberg (1926) examined twins at the average age of 15½ years. He found compressions caused during delivery produced average extension of head of 1.25 ± 0.40 and of face of 1.08 ± 0.38. This implies permanent effects of delivery on the face. Hofbauer (1943) found no connection between type of delivery and occlusion. Anders Lundström (1944) found that premature loss of deciduous teeth did not produce interarch disturbances but only local crowding.

Vertical overbite in cases of loss of deciduous teeth was found to be associated with crowding of premolars. Early loss of deciduous teeth in the lower jaw leads to increase in overbite.

Seipel (1947) found space opening after complete closure to allow eruption of a second premolar.

Mouth-breathing was not a direct factor in malocclusion.

Johnson found in cross-breeding of dogs that there is a greater tendency toward the inheritance of normal occlusion than the opposite, although variations in occlusion are more prevalent.

Positive hereditary influences have been found for method of eruption, abnormalities of eruption, and for size of the teeth, also for size of the dental arches.

Abel (1932) found that children in mixtures of Busbinan, Hottentots, and Negroes showed increase of malocclusion, especially crowding of the teeth.

He presents this as proof that size of the teeth and size of the jaws are inherited independently from each other. Teeth of the taller races and jaws of the smaller races or vice versa might occur.

Anders Lundström accepted similarity of the twins as a basis for monovular twins (identical) (monozygocity).

A. Lundström also measured 140 boys and 87 girls 13 years of age.

Variation in tooth size of fraternal twins is lower than in the general population. The general population exhibits variation of an overage 1.4 times as great as fraternal twins.

Actual variation in the size of the teeth and of tooth position in the dental arch is greater in the general population than in fraternal twins. This is due to the fact that the heredity or the environmental factors vary more in the general population than in families.

Identical twins show less dissimilarity in number and position of teeth lost in comparison to fraternal twins and to theoretical calculations in the general population. This may be due to similarity of environment as well as to genetic influences.

Differences in identical twins are due to environment since these twins have the same genotype.

Differences in fraternal twins are conditioned by heredity.

Internal differences in twins causing variations include pH, metabolism, and strength of genes. Etiological factors may be genetic, environmental, and internal differences and their distribution in the right and left sides. (Table I.)

TABLE I

TYPE OF TWINS	SEX	I_1			I_2			C		
		NO. OF TOOTH PAIRS	$M_D \pm \epsilon\ (M_D)$	σ_D	NO. OF TOOTH PAIRS	$M_D \pm \epsilon\ (M_D)$	σ_D	NO. OF TOOTH PAIRS	$M_D \pm \epsilon\ (M_D)$	σ_D
Identical	M.	37	0.07 ± 0.037	0.22	38	0.15 ± 0.058	0.36	33	0.00 ± 0.038	0.22
	F.	54	0.05 ± 0.023	0.17	50	0.12 ± 0.054	0.38	48	0.00 ± 0.024	0.16
Fraternal	M.	42	0.13 ± 0.028	0.18	42	0.10 ± 0.042	0.27	33	0.00 ± 0.031	0.18
	F.	52	0.08 ± 0.030	0.22	48	0.06 ± 0.050	0.34	47	0.07 ± 0.029	0.20
Average mat. (13 yr.)	M.	114	0.04 ± 0.021	0.22	113	0.09 ± 0.023	0.25	112	0.03 ± 0.016	0.17
	F.	55	0.04 ± 0.024	0.18	52	0.05 ± 0.038	0.27	59	0.03 ± 0.018	0.14
Total		354	0.06 ± 0.010	0.19	343	0.09 ± 0.016	0.30	332	0.02 ± 0.009	0.17

All the differences are positive.

Anders Lundström accepts the fact that large teeth are more often crowded than small ones, which are instead more frequently spaced, indicating that there are special genes which affect the teeth but not the jaws, and vice versa.

While general crowding of teeth has a genetic origin, local crowding is more of an environmental phenomenon.

With regard to the extreme malocclusions, Anders Lundström found similarities and dissimilarities in both identical and fraternal twins, with a preponderance of dissimilarities in the fraternal twins. This he accepts as an indication that heredity plays a part in the expression of the type of malocclusion.

Anders Lundström found a standard deviation of 0.19 for the dissimilarities between the left and right maxillary central incisors for the general population. In identical twins this was 0.22^m and for fraternal twins 0.52^m. For the lateral incisors the figures are 0.37^{mm}, 0.38^m, and 0.58^m. For the canines the standard deviations found were 0.18^m, 0.21^m, and 0.39^m. For other individual teeth the figures vary between 0.14^m and 0.34^m for identical twins and between 0.32^m and 0.64^m for fraternal twins.

From first molar on one side to first molar on the other in the upper jaw, the standard deviation is 1.3^m for identical and 4.2^m for fraternal twins. In the lower the figures are 1.1^m and 4.2^m.

Dissimilarities in tooth size are attributed to Dahlberg by Anders Lundström to the following:

1. Factors which cause differences between left and right sides, which are distributed at random and which are active during the development of the fetus, but which can also be attributed to environmental and genetic factors with unilateral effects.
2. Environmental factors with symmetric effect such as variations in nutrition, function, etc.
3. Genetic factor with symmetric effect.

Hereditary factors are found to play at least as important a role as environmental factors in tooth arrangement, with heredity being the more important factor in severe malocclusion where special environmental factors are not demonstrable.

Inheritance of Missing Incisors: By Hugo Iltis, *J. Heredity* **39**: 363-366, December, 1948.

Röse, in an extensive study, found degeneration or absence of the upper lateral incisors in Scandinavia in 6 per cent of the population; in Central Europe in between 2 and 4 per cent, among colored races in about 1 per cent. Hrdlička found degeneration of the upper lateral incisors in 3 per cent of a thousand white Americans. Like Röse he found absence of one or both upper lateral incisors more frequent in females (3 per cent) than in males (1.4 per cent). In a more recent investigation, Campbell reports that in 3,550 patients 3.7 per cent lacked both upper lateral incisors. This probably gives a reasonable basis for estimating the gene frequency.

Absence of upper lateral incisors is not restricted to modern man but was found, though less frequently, in fossil human skulls (0.1 per cent by Schultz) and in the skulls of monkeys.

The reduction of the number of teeth may be called a "meristic variation" according to Bateson's terminology. Many authors write of "the tendency to reduction" of the human dentition which is considered by Schultz a "regressive variation" connected, perhaps, with the "change of food habits." Formulated in modern concepts that would mean that the mutation, which probably depends upon a gene inhibiting the development of the upper lateral incisors, is not eliminated by natural selection since its adverse influence is balanced by the change of food habits. Similar genes are connected with the inhibition of the development of the lower central incisors and of the third molars (wisdom teeth). These three centers of reduction concern those teeth which are less essential, due to the adoption of softer foods.

A characteristic correlative development which has been observed by several authors, and which characterizes also both cases reported here, is the compensatory increase in the size of the remaining upper central incisors.

The pedigree in one patient shows four cases in two generations. The proband believes that the condition also was present in the preceding generations, but no reliable records were available. Of the four cases, two were males and two were females. In two cases neither of the parents showed the character, but it appeared in their child. The pedigree suggests a recessive gene for the tooth defect.

The pedigree in another patient shows nine cases in two generations. The character was probably present in the preceding generation, but no reliable records were available. It appears that the gene was transmitted into the family by the two sisters I-2 and I-3, whose children, the first cousins II-3 and II-4, married. Five cases of missing incisors are reported in the succeeding generations.

In this pedigree there are three instances in which neither of the parents of an affected individual showed the deficiency. This pedigree also favors the conclusion that the gene in question is probably recessive. This assumption is also supported by the fact that none of the four children of the affected mother manifested the defect.

The preponderance of females in this pedigree agrees with the reports of other authors. There is, however, no reason to consider the character sex-linked.

Many other cases of missing incisors have been described in the literature, but in none has a recessive mode of inheritance been reported. Jöhr in an extensive study of an isolated Swiss village noted the high frequency of missing incisors. Of 162 persons investigated, about one-third showed reduction or absence of the upper lateral incisor. An extensive pedigree confirmed the

"dominant inheritance of this condition." Wheeler calls the character dominant; Keeler and Short, "an irregular dominant"; Schultz, "an extreme case of a dominant character which is more frequent in the female." Hoskins describes the gene in the families he studied as a "sex-linked partial dominant" and explains the abnormal inheritance by the "variability in penetrance and expressiveness of a sex-linked gene."

Our recessive case completes the entire scale of inheritance from "dominant," to "irregular dominant," to "sex-linked" and "recessive."

Studying such encyclopedias of human genetics as those of Gates or Baur-Fischer-Lenz, we shall not find too many instances of clear-cut Mendelian segregation of human characteristics. Even in those characteristics which are usually cited in textbooks as notable examples of a specific type of segregation (brachydactylia or diabetes insipidus for dominant, ablinism or feeblemindedness for recessive, color blindness or hemophilia for sex-linked inheritance) are not always "classical" in their inheritance.

Part of our difficulties are due to the fact that "man is not a satisfactory experimental animal." Hence we must confess today, after almost half a century of research, that our knowledge regarding the inheritance of human characteristics is still inadequate. We need more knowledge, and we have every reason to be modest in our conclusions and very careful in formulating practical applications.

News and Notes

American Board of Orthodontics

The 1950 meeting of the American Board of Orthodontics will be held at the Edgewater Beach Hotel, Chicago, Illinois, May 4, 5, 6, and 7. Orthodontists who may desire to be certified by the Board may obtain application blanks from the Secretary, Dr. Stephen C. Hopkins, 1726 Eye Street, N. W., Washington 6, D. C. Applications must be completed not later than March 1, 1950, for consideration at the Chicago meeting.

Northeastern Society of Orthodontists

The fall meeting of the Northeastern Society of Orthodontists will be held on Nov. 28 and 29, 1949, at the Hotel Commodore, New York.

Central Section of the Pacific Coast Society of Orthodontists

The meeting of the Central Section of the Pacific Coast Society of Orthodontists was held at the Alexander Hamilton Hotel Tuesday, Sept. 13, 1949.

Members present were: Ray Lussier, Kenneth Terwilliger, Fred Epley, Lyle Russell, Howard Jan, Murray Ballard, Richard Railsback, Howard Dunn, John Parker, Ben Ledyard, Charles Konigsberg, J. Kester Diment, Elgin Jackson, C. W. Carey, Roy Cowden, William Smith, George Hahn, Arthur Skaife, Raymond Brownell, Ray Curtner, Carl Engstrom, Earl Lussier, J. Camp Dean, Fred Wolfsohn, Seymore Gray, F. W. Havrilla, Allen Scott, and Reuben Blake.

The program was turned over to Program Chairman Roy Cowden, who introduced the speaker of the evening, Alton W. Moore, D.D.S., Executive Officer, Department of Orthodontics, University of Washington, School of Dentistry, Seattle, Washington.

His subject was, "Growth of the Skull as Revealed by Vital Staining." The subject was a research project performed by Dr. Moore to reveal the growth sites of the head and face by means of vital staining. The subject matter was a Macaque monkey. His excellent talk was supplemented by slides and presented material of interest to orthodontists. Chairman Cowden appropriately thanked Dr. Moore for this interesting presentation, and the enthusiasm of the members gave testimony of its interest.

Southern Section of the Pacific Coast Society of Orthodontists

The Southern Section of the Pacific Coast Society of Orthodontists held its regular quarterly meeting at the home of Dr. Milus M. House, 1001 Floral Drive, Whittier, California.

At 2:30 P.M., the meeting was called to order by Chairman Sydney Cross, who introduced Jesse Linn, the chairman of the day.

The following program was presented:

Lecture by Dr. House on "Growth and Development" and "Study of Ideal Occlusion and Effect of Tooth Loss on Jaw Development and the Occlusion of the Teeth."

Thomas P. Hinman Mid-Winter Clinic

The Thirty-seventh Annual Meeting of the Thomas P. Hinman Mid-Winter Clinic will be held at the Municipal Auditorium, Atlanta, Georgia, March 19, 20, 21, and 22, 1950. The general chairman is Dr. Sidney L. Davis, 932 Candler Building, Atlanta, Georgia, exhibit chairman, Dr. J. A. Broach, 1105 Doctors Building, Atlanta, Georgia.

University of Toronto

The University of Toronto has recently remodeled almost the entire fourth floor of the dental building to provide more adequate graduate training facilities. These facilities include a twelve-chair graduate clinic, several clinical demonstration rooms, graduate laboratory, sterilization room, seminar room, and complete reorganization of the orthodontic department.

Special emphasis has been given to the field of orthodontics in the new graduate department, and Dr. Robert E. Moyers has been named as professor and head of the Department of Orthodontics. Dr. Moyers received his undergraduate and professional training at the State University of Iowa, where he also received an M.S. degree in orthodontics and a Ph.D. degree in physiology.

Postgraduate Seminar in Orthodontics

In response to numerous requests for postgraduate instruction for those who include orthodontics in their practice, the Postgraduate Committee has arranged a "Seminar on Clinical Orthodontics" which will be given in January, 1950, at the Headquarters of the First District Dental Society, New York. The instructors in the course include the following: Drs. J. A. Salzmann, Joseph D. Eby, Sidney E. Riesner, and Lowrie J. Porter. This group of practicing specialists in orthodontics require no introduction to those who are engaged in the practice of orthodontics, whether or not they devote their entire activity to this specialty.

This course reviews currently accepted procedures in orthodontic diagnosis, prognosis, treatment planning, and retention. While there will be no stress placed on any special "system" of appliance therapy, mechanics will be discussed in relation to treatment of individual cases. Practical cases from the respective practices of the instructors will be presented, illustrated, and discussed.

In addition, there will be a round table discussion during which a series of specially selected questions will be answered and participation from the students will be invited. The following topics will be presented by the instructors and illustrated with lantern slides:

1. Orthodontic Diagnosis; Preparation of Diagnostic Aids.
2. Planning of Treatment; Sequence of Application of Mechanics in Orthodontic Therapy.
3. Discussion of Treated Cases.
4. Factors Involved in Tooth Movement and in Changes in Interarch Relationship.
5. Extraction in Orthodontic Therapy.

This course is open to general practitioners who possess acceptable basic knowledge of the principles and practice of orthodontics, as well as to specialists in orthodontics.

M. E. Michaelson, *Chairman*,
Postgraduate Classes.

New Associate Dean for Dentistry at Columbia University

President Dwight D. Eisenhower recently announced the appointment of Dr. Maurice J. Hickey, D.M.D., M.D., Professor of Oral Surgery, as Associate Dean for Dentistry in Columbia University's Faculty of Medicine, and the resignation of Dr. Bion R. East from that position.

During the past year, Dr. Hickey has served as Acting Associate Dean in the absence of Dr. East, who has been on leave from Columbia to serve as Chief of the Dental Service with the Veterans Administration. Dr. East remains on leave from his professorship in the University.

The new associate dean joined the Faculty of Medicine in 1945, after serving in England and France for three years as Chief of Dental Service for the 2nd General Hospital, the Army unit composed of staff members of the Columbia-Presbyterian Medical Center.

Dr. Hickey, a native of Syracuse, New York, was graduated from the Harvard School of Dentistry in 1932. After a year as dental intern at the Columbia-Presbyterian Medical Center, he entered the College of Physicians and Surgeons and received his medical degree in 1937. He then served a year's surgical internship at the Strong Memorial Hospital, Rochester, New York.

Returning to the Medical Center in 1938 as one of the first Fellows to be named by the National Cancer Institute, he spent two years as a resident in training, specializing in head and neck surgery. In 1940 Dr. Hickey began a two-year residency in plastic surgery at the Medical Center which continued until he joined the 2nd General Hospital unit in 1942.

Midcentury White House Conference on Children and Youth

The fifth conference on children and youth has been called by President Truman at the White House. The conference will be held in Washington late in 1950. The conference is being held because the world in which our children are growing up is undergoing greater physical and social change than in any earlier period. What we know about people lags far behind what we know about the inventions which are rapidly changing our world.

More than ever, in this day of atomic energy, children must learn how to direct their own energies to get along with themselves and with others, in peace and good will.

The United States is richer in children than in any other period of its history. With the wartime boom in babies and the steady decrease in deaths, we now have forty-six million children under 18 years of age.

Our services to them have not kept pace with their needs. If all our children are to have the chance to develop into the kind of adults this new world needs, we must take action now. We must have *more* and *better* services, houses, hospitals, health centers, schools, playgrounds and other facilities. We must have *more* and *better* teachers, doctors, nurses, social workers and other skilled workers. We must have *more* parents who understand how children grow physically, mentally, emotionally, and in social responsibility.

Our waste in children is great. It costs us heavily in delinquency, job misfits, victims of race prejudice and discrimination, the mentally and physically ill. By assembling the knowledge we have and putting it to work, by acquiring new knowledge and putting that to work, we can stop much of this waste.

There are seven objectives which are recommended for the 1950 conference:

1. Focus attention on *our concern for children and youth* in a world in which spiritual values, democratic practice, and the dignity and worth of the individual are of first importance.

2. Bring together, in usable form, our *present knowledge* about the status of children, their physical, mental, emotional, and moral development; and identify areas in which further knowledge is needed.

3. Point up the *needs of parents* in providing adequately for their children and suggest ways of helping them do a better job.

4. Look at the physical, social, economic, and moral *environment* in which children are growing up, and recommend ways of improving it.

5. Size up *present services* for children and youth; map the direction in which services should develop; point up ways in which the number of qualified workers can be increased and the skills of these workers sharpened.

6. Examine into the ways people are now *working together* for children; and develop ideas for more effective teamwork.

7. Initiate steps for the *achievement* of the conference recommendations in the coming decade.

This Midcentury Conference starts from the premise that the people who are closest to the daily lives of children bear the greatest responsibility for them. The conference, therefore, will be guided in large measure by the needs and experience of those who are caring for children day by day. It will be a conference where lay citizens, professional workers, and public servants thrash out together their separate and mutual problems.

This will be the first White House Conference in which young people will take part fully and responsibly. They will participate in the policy-making, sit in on committees, national, state, and local, and contribute their ideas, abilities, and skills toward the objectives which they share with adults.

Through joint study from a national, state, and local point of view, the conference will bring together significant knowledge about children, their homes and communities, and will point to the gaps in our knowledge. It will highlight the paths on which we must travel to develop young people who are secure within themselves and equipped for a changing world.

State organizations with concern for broad planning for children were at work. With the further development of the conference program, it is expected that committees will be organized in every state and territory.

State committees are:

1. Assisting in the study of children's problems and needs, and helping to find new solutions.
2. Conducting surveys of child health, welfare, education, and recreation programs in local communities with a view to finding the gaps, bolstering the weak spots, and encouraging the strong programs.
3. Setting up state-wide goals for children's services, and stimulating broad-scale responsible citizen action to move in the direction of these goals.
4. Encouraging discussion groups, developing literature, and sponsoring projects to bring to the people the latest information and guidance in child health, welfare, and education.

A MESSAGE FROM THE CHAIRMAN

In calling a Midcentury White House Conference on Children and Youth, President Truman offers the people of the United States an opportunity to ask themselves the question: "Are we, the richest nation in the world, doing all we should to give our children a fair deal?" The answers to that question which the conference brings forth will influence not only this generation of children but should contribute to the welfare of the whole nation.

The President has thrown this conference open to all the people and has appointed a committee of widely representative leaders to direct the task. He has asked me to serve as chairman of that committee. I accept the assignment with great happiness and with a deep sense of responsibility because I feel this conference can be one of great significance. Citizens all over the country will team up with professional workers in many fields and with representatives of public agencies to work for all the people's children. While the conference itself will take place in Washington, its center of interest and action will extend to every town and village, to every home and farm where children live.

OSCAR R. EWING, Federal Security Administrator.

President's Call for Midcentury Conference Touches off Action.—President Truman's call on August 31 for a Midcentury White House Conference on Children and Youth released dynamic forces that had built up during three years of preparatory work by the National Commission on Children and Youth, the Federal Interdepartmental Committee on Children and Youth, the Joint Interim Committee for the Midcentury White House Conference, State planning bodies, and by cooperating national organizations and individuals having broad concern for children and their needs. It is only a matter of days since the President's call, yet:

A National Committee of 52 citizens has been appointed by the President, under the chairmanship of Federal Security Administrator Oscar R. Ewing, to give a general direction to the whole undertaking.

The majority of the governors of all states and territories and the commissioners of the District of Columbia have reported designation or appointment of state committees for the Conference in response to telegrams from the President; many have already reported formation of county committees to carry out self-study and community action programs.

Discussions have been carried on with, and materials have been sent to, representatives of several hundred organizations concerned with children. Plans are under way to involve fully the technical skill and the resources of these national bodies, lay and professional, in the White House Conference activities.

Participation of agencies of the Federal Government in the work of the Conference is well advanced. Through the cooperation of the Federal Interdepartmental Committee on Children and Youth a plan has been worked out for widespread help from the various governmental agencies with programs involving children.

The National Committee has held a two-day meeting in which the theme for the Conference was decided; the *week of Dec. 3, 1950,* was set as the date for the Conference; and an organizational framework was approved for the development of activities leading up to the Conference, preparation of the Conference program, and development of post-Conference follow-up measures.

A financial plan has been developed and a substantial grant toward the budget has been received from the Children's Fund of Michigan.

President Outlines Purposes of the 1950 Conference.—"I know of no greater challenge facing the world today than how it can help its children to be secure in themselves, in their families, and in their communities," President Truman wrote the National Committee members in asking them to serve. "It is through secure and happy children and families," he said, "that we make an important contribution toward that kind of national and international well-being that makes for world peace." His letter to the prospective members of the committee stated in part:

"This will be the fifth in a series of conferences on children held every ten years on the call of the President of the United States. Each of the earlier conferences made notable contributions to national understanding of the needs of children and youth and to the development of principles and programs to advance their well-being.

"The Midcentury White House Conference on Children and Youth has, I believe, a rare opportunity to turn its searchlight on the great advances made in the last decade in health, welfare and education. Part of the responsibility of the Conference will be to bring together our best knowledge about children and to ascertain ways of applying this knowledge in homes, schools, churches and the entire community. Through the cooperation of State and local groups throughout the Nation, I am asking that study be undertaken of significant, unsolved problems in child life in this country. Through the joint efforts of citizen groups everywhere, and of competent experts, I look for solutions to some of the unanswered questions about child life in this country, as guides to parents and to all who work with children."

The National Committee.—The fifty-two-member National Committee, comprised of educators, physicians, clergymen, business and professional men, civic leaders and youth representatives, and labor and farm leaders, was appointed by the President to give general direction to the entire Conference undertaking. This includes the completion of the preparatory work, the arrangements for and conduct of the conference program itself, and the development of plans for postconference follow-up activities.

Questions and Answers.—

How was the National Committee formed? The 52 citizens appointed as members of the National Committee for the Midcentury White House Conference were selected primarily for their interest in children and youth and their demonstrated ability to contribute knowledge and experience which will further the aims of the nationwide effort.

How will national organizations participate in the Conference? An advisory council to the National Committee will provide for direct representation by national organizations having interests in children and youth. Through this council will be brought to the Conference Committee the knowledge, experience, and resources of national organizations; it will stimulate

participation of national organizations in the preliminary fact-finding and the follow-up plans of the Conference. Persons from national organizations will also be asked as individuals to serve on the technical committees of fact-finding and communications.

How will local groups interested in children participate in the Conference? Through national organizations which have local constituencies as well as through state and county citizens' committees which are being formed for the Conference.

How may I go about receiving an invitation to the Conference? The Conference program and the participants are still to be determined by the National Committee; decision will follow considered study and advice by a special committee.

Is this a Government-financed venture? Toward the total budget of $412,946, a Congressional appropriation of $75,000 represents the only Government financing. With the balance of $312,946 to be obtained from private grants ($30,000 has already been pledged), the actual work of fact finding and implementation of recommendations will primarily be a privately supported venture.

First Meeting of National Committee at White House, September 8-9.—Over two-thirds of the National Committee members were present at the first meeting on September 8-9 at the White House.

President Truman, addressing the opening session, expressed hope that some of the important problems relating to child life that confront the country today can be remedied by the Midcentury White House Conference. He listed as "most important the mental attitude of young people." National Committee Chairman, Oscar R. Ewing, presided over the two-day sessions.

The full text of the President's remarks, as well as of Mr. Ewing's opening address outlining the task of the National Committee, and of Katharine F. Lenroot's discussion and analysis of the previous White House Conferences, will be available in reprint form after publication in the October issue of *The Child.* (Children's Bureau, Federal Security Agency, Washington 25, D. C.)

Extensive groundwork for the 1950 Conference has been laid over the past three years. Leonard W. Mayo reported to the Committee. Preparatory work by the National Commission on Children and Youth, the Federal Interdepartmental Committee on Children and Youth, by state planning bodies, and by many operating national organizations, Mr. Mayo explained, culminated in a set of recommendations for the Conference effort. These have been offered through a report of the Joint Interim Committee on the Midcentury White House Conference. The National Commission has withdrawn from active functioning until such time after the Conference as it may be deemed necessary again to convene this group.

The Focus of the Midcentury Conference.—Consideration was given to the fact that previous White House Conferences have been concerned primarily with physical and economic problems affecting children and youth; that at the midcentury mark the greatest contribution toward advancing the well-being of children would be to focus attention and to concentrate studies on how children could learn to live with others; on developing a healthy personality and on what would be needed socially, economically, and psychologically to rear an emotionally and intellectually sound generation.

The committee agreed that a theme based on such an approach to child development was appropriate and useful; that there is sufficient knowledge in the social sciences that could be gathered and applied to the social institutions affecting children; and that the approach could well be used by state and local groups. The following statement was adopted:

The Midcentury White House Conference on Children and Youth bases its concern for children on the primacy of spiritual values, democratic practice, and the dignity and worth of every individual. Accordingly, the purpose of the Conference shall be to consider how we can develop in children the mental, emotional, and spiritual qualities essential to individual happiness and to responsible citizenship.

To do this the Conference shall:

a. Bring together in usable form pertinent knowledge related to the development of children and indicate areas in which further knowledge is needed.

b. Examine the environment in which children are growing up, with a view to determining its influence upon them.

c. Study the ways in which the home, the school, the church, welfare agencies and other social institutions, individually and cooperatively, are serving the needs of children.

d. Formulate, through cooperative efforts of laymen and specialists, proposals for the improvement of parental, environmental, and institutional influences on children.

e. Suggest means whereby these proposals may be communicated to the people and put into action.

The objectives of such a conference theme would be to bring about at least five major results:

a. Stimulation of parent education improved in quantity and quality.

b. Greatly heightened citizen participation in studying and meeting the needs of children.

c. Acceptance in principle and practice by all agencies dealing with children of the need to keep their programs up to date in the light of new knowledge being developed in the social sciences.

d. A multidiscipline approach to children and the development of a common core of knowledge about children for all the professions dealing with them.

e. Clarification of areas where research is needed.

Broad Citizen Participation Stressed by National Chairman.—Broadest possible citizen participation in the Midcentury White House Conference on Children and Youth is being sought, Oscar R. Ewing, Chairman of the National Committee, announced. The 1950 Conference to an extent greater than any of the preceding four decennial conferences will seek the active cooperation of the man and woman on Main Street. It is the first conference in which young people of high school and out-of-school ages are included in national planning as well as state and local programs.

Mr. Ewing laid particular stress on citizen participation when at the President's request he wrote state governors regarding the formation of state and local committees. His letter stated in part:

". . . We hope for the assistance of the Governors in encouraging the broadest kind of State participation through State Midcentury White House Conference Committees. . . . It is planned that the National Committee will work closely with the official State groups so that through them there can be brought together the thinking and leadership, the plans, the hopes and the aspirations of those who are closest to children and young people in their families and their communities. Suggestions and recommendations from State groups will be invited toward assisting the National Committee in its work. The State Committees are expected to form the nucleus of study groups, survey activities and discussion forums which will help dramatize children's needs, make available the latest scientific information about developments in children's services, and provide media for post-Conference follow-up activities to the Midcentury White House Conference on Children and Youth.

"I should be grateful, as Chairman of the National Committee, if you will advise me of your action with regard to the designation of an existing body, or if necessary, the creation of a special representative citizen committee, to serve as the State Committee for the Midcentury White House Conference on Children and Youth. Would you be good enough to inform me of the membership of the committee, and the name and address of the chairman, in order that the National Committee may promptly establish a channel of communication with your state group?

"I believe that this Midcentury White House Conference can make a signal national contribution to the advancement of the well-being of our children. To do this, however, we need the help and participation of the Governors and of all the people of this Nation."

Governors' Responses Regarding Formation of State Committees.—As of Sept. 23, 1949, responses had been received from thirty-three states and territories and the District of Columbia indicating that committees for the Midcentury White House Conference on Children and Youth are being established.

Included in this total are fourteen states in which committees have already been designated or appointed, as follows:

Alabama State Advisory Committee on Children and Youth.
Arkansas Council on Children and Youth.
California Youth Committee.
District of Columbia Committee for the Midcentury White House Conference.
Florida Children's Commission.
Georgia Congress of Parents and Teachers.
Iowa Commission for Children and Youth.
Minnesota Youth Conservation Commission.
North Carolina Conference for Social Service.
Ohio Commission on Children and Youth.
Oregon Governor's Committee on Children and Youth.
Texas Youth Development Council.
Wisconsin Commission for Children and Youth.
Wyoming Youth Council.

Also included are sixteen states and three territories which have reported action to establish committees. They are:

Colorado
Connecticut
Illinois
Louisiana
Maine
Massachusetts
Nevada
New Hampshire
New Mexico
New York
North Dakota
South Carolina
South Dakota
Tennessee
Virginia
West Virginia

Alaska
Puerto Rico
Virgin Islands

American Dental Association

The United States had a total of 86,904 dentists in mid-1949, an average of one dentist for each 1,727 residents, it was reported today by the Bureau of Economic Research and Statistics of the American Dental Association.

The new estimated total is a gain of approximately 5,600 over the number of dentists listed in a similar survey conducted by the Association two years ago. In 1947, it was estimated that the dentist-population ration was one dentist for each 1,817 persons.

The report also revealed that 2,767 dentists, or about one in each thirty, are employed by the Army, Air Forces, Navy, Veterans Administration, and United States Public Health Service.

Distribution of dentists throughout the nation still varies widely, according to the report, ranging from a ratio of one dentist for each 1,029 residents in New York State to a ratio of one dentist for each 4,472 residents in South Carolina.

Among regions of the country, the most favorable ratio of dentists to population was recorded in the Middle East with an average of 1,332 persons for each dentist. For both

New England and the Far West, the report showed a ratio of one dentist for each 1,441 persons. Total population per dentist for other regions was reported as: Central, 1,568; Northwest, 1,726; Southwest, 3,099; and Southeast, 3,283.

According to the report, the estimated number of dentists and the population per dentist by region and state for mid-1949 are as follows:

REGION AND STATE	NUMBER OF DENTISTS	POPULATION PER DENTIST
New England	6,335	1,441
Connecticut	1,486	1,336
Maine	425	2,106
Massachusetts	3,511	1,317
New Hampshire	261	1,992
Rhode Island	485	1,524
Vermont	167	2,174
Middle East	25,954	1,332
Delaware	134	2,239
District of Columbia	736	1,137
Maryland	848	2,505
New Jersey	3,177	1,489
New York	13,797	1,029
Pennsylvania	6,550	1,598
West Virginia	712	2,683
Southeast	9,062	3,283
Alabama	712	4,060
Arkansas	450	4,302
Florida	1,138	2,104
Georgia	882	3,563
Kentucky	934	3,029
Louisiana	1,025	2,518
Mississippi	486	4,329
North Carolina	967	3,885
South Carolina	436	4,472
Tennessee	1,002	3,164
Virginia	1,030	2,909
Southwest	3,496	3,099
Arizona	234	2,966
New Mexico	168	3,339
Oklahoma	838	2,727
Texas	2,256	3,233
Central	24,872	1,568
Illinois	6,300	1,317
Indiana	1,973	1,984
Iowa	1,705	1,532
Michigan	3,340	1,859
Minnesota	2,318	1,265
Missouri	2,571	1,513
Ohio	4,157	1,884
Wisconsin	2,508	1,315
Northwest	4,390	1,726
Colorado	775	1,529
Idaho	255	2,298
Kansas	1,011	1,861
Montana	305	1,669
Nebraska	932	1,372
North Dakota	331	1,758
South Dakota	244	2,492
Utah	399	1,672
Wyoming	138	2,029

REGION AND STATE	NUMBER OF DENTISTS	POPULATION PER DENTIST
Far West	10,028	1,441
California	7,266	1,406
Nevada	93	1,763
Oregon	1,106	1,481
Washington	1,563	1,554

Orthodontic Society of South America

At a recent meeting of the Orthodontic Society of South America, the following officers were elected:

President	Arturo Toriello
Vice-President	German Moreno
Secretary	Eduardo Manns
Treasurer	Pedro Gandulfo
Librarian	Sergio Silva

Notes of Interest

Albert J. Colle, D.D.S., announces the opening of his office in Suite 428, Medico Dental Building, 1396 St. Catherine Street, W., Montreal, Canada, telephone HArbour 4432, practice limited to orthodontics.

George F. Gales, D.M.D., announces the opening of his office at 68 Russell Park, Quincy, Massachusetts, telephone PResident 3-5057, practice limited to orthodontics.

Dr. Samuel J. Lewis, formerly of Detroit, Michigan, has opened an office at 704 American National Bank Building, Kalamazoo, Michigan, for the exclusive practice of orthodontics.

Erratum

In an article, "Criteria for Extraction in Orthodontic Therapy Related to Dentofacial Development," by J. A. Salzmann, D.D.S., the following references were inadvertently omitted:

1. Margolis, H. I.: The Axial Inclination of the Mandibular Incisors, AM. J. ORTHODONTICS AND ORAL SURG. **29**: 571-594, 1943. In this paper, Dr. Margolis originally described the axial relationship of the mandibular incisors to the mandibular plane.

2. Montague, M. F. Ashley: Facial Reconstruction. *Notes,* Am. J. Phys. Anthropol., n.s., **6**: 321, 1948. This article relates to the uncertainty of reconstructing facial appearance from skeletal remains.

3. Margolis, H. I.: A Basic Facial Pattern and Its Application in Clinical Orthodontics, AM. J. ORTHODONTICS AND ORAL SURG. **33**: 631-641, 1947.

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St. Louis 3, U. S. A.

Entered at the Post Office at St. Louis, Mo., as Second Class Matter.

Published Monthly. Subscriptions may begin at any time.

Official Publication of The American Association of Orthodontists,
its components societies and The American Board of Orthodontics

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